

BAE SYSTEMS

INSTRUCTION MANUAL
FOR THE
WJ-8625-1 VLF RECEIVER

Courtesy of <http://BlackRadios.terryo.org>

INSTRUCTION MANUAL
FOR THE
WJ-8625-1 VLF RECEIVER

This document and the subject matter disclosed herein are proprietary items to which Watkins-Johnson Company retains the exclusive right of dissemination, reproduction, and sale.

WARNING

This equipment employs dangerous voltages which may be fatal if contacted. Exercise extreme caution in working with this equipment with any of the protective covers removed.

CUSTOMER SERVICE INFORMATION

EQUIPMENT MALFUNCTIONS

This unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. If an apparent malfunction is encountered after installation, verify that the correct input signals are present at the proper connectors. Prior to taking any corrective maintenance action or breaking any seals, contact your Watkins-Johnson representative, or the Watkins-Johnson Company Service Department to prevent the possibility of voiding the terms of the warranty. Contact the Watkins-Johnson Company via mail, telephone, wire, or cable at:

Watkins-Johnson Company
Company Service Department
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794

Toll Call: (301) 948-7550 Ext. 7201
TELEX: 89-8402
TWX: 710-828-0546
TELEFAX: (301) 921-9479
EASYLINK: 62928185

If reshipment is necessary, follow the instructions in the following paragraph (Preparation for Reshipment or Storage). Do not return the equipment until a Return for Maintenance Authorization (RMA) number has been obtained from the Watkins-Johnson Company's Customer Service Department. See Item 10 in the **General Terms and Conditions of Sale** paper (WJ Form # WJ-151-X) for more information on equipment returns.

PREPARATION FOR RESHIPMENT OR STORAGE

If the unit must be prepared for reshipment, the packaging method should follow the pattern established in the original shipment. Use the best packaging materials available to protect the unit during reshipment or storage. When possible, use the original packing container and cushioning materials. If the original packing materials are not available, use the following procedure:

1. Wrap the unit in sturdy paper or plastic.
2. Place the wrapped unit in a strong shipping container and place a layer of shock-absorbing material (3/4-inch minimum thickness) around all sides of the unit to provide a firm cushion and to prevent movement inside the container.

CUSTOMER SERVICE INFORMATION

3. If shipping the unit for service, fill out all information on the 5x6 PRODUCT DISCREPANCY REPORT card (WJ Form # WJC-QA55-0) that was provided with the original shipment. Also ensure that the Return for Maintenance Authorization (RMA) number is recorded on the card. If this card is not available, attach a tag to the unit containing the following information:
 - a. Return for Maintenance Authorization (RMA) number.
 - b. The Watkins-Johnson Type/Model number of the equipment.
 - c. Serial number.
 - d. Date received.
 - e. Date placed in service.
 - f. Date of failure.
 - g. Warranty adjustment requested, yes or no.
 - h. A brief description of the discrepant conditions.
 - i. Customer name and return address.
 - j. Original Purchase Order/Contract number.
4. Thoroughly seal the shipping container and mark it **FRAGILE**.
5. Ship to:

Watkins-Johnson Company
700 Quince Orchard Road
Gaithersburg, Maryland 20878-1794
U.S.A

When storing the equipment for extended periods, follow the above packing instructions to prevent damage to the equipment. The safe limits for storage environment are:

Temperature: -40 to +70°C
Humidity: less than 95%

WJ-8625-1 VLF RECEIVER

REVISION RECORD

**WJ-8625-1 VLF RECEIVER INSTRUCTION MANUAL
REVISION RECORD**

REVISION	DESCRIPTION	DATE
A	Initial issue.	12/87
B	Errata. Added Slideback Voltage Input for Auxiliary Output Connector pin-out descriptions.	11/88

TABLE OF CONTENTS

SECTION I

GENERAL DESCRIPTION

<u>Paragraph</u>		<u>Page</u>
1.1	Electrical Characteristics	1-1
1.2	Mechanical Characteristics	1-1
1.3	Operational Overview	1-2
1.3.1	Basic System Organization	1-2
1.3.2	Equipment Required But Not Supplied	1-2
1.3.3	Optional Equipment	1-4
1.4.	Equipment Specifications	1-4

SECTION II

INSTALLATION AND OPERATION

<u>Paragraph</u>		<u>Page</u>
2.1	Unpacking and Inspection	2-1
2.2	Repacking	2-1
2.3	Installation Procedures	2-1
2.3.1	Input/Output Connectors	2-2
2.3.1.1	Power, Command/Control (J1)	2-2
2.3.1.2	50 MHz Reference Input (J2)	2-2
2.3.1.3	Auxiliary Output (J6)	2-4
2.3.1.4	RF Input (J3)	2-4
2.3.1.5	SM Output (A4J1)	2-4
2.3.1.6	455 kHz IF Output (A4J2)	2-4
2.3.1.7	Selected Video Output (A4J3)	2-4
2.3.2	Controls and Indicators	2-4
2.3.2.1	Power/Unlock Indicator	2-6
2.3.2.2	Active Indicator	2-6
2.3.2.3	Squelch Indicator	2-6
2.4	Receiver Operation	2-6
2.4.1	Operation from a Master Receiver/ Receiver Controller	2-6
2.4.2	Operation from a Computer Terminal	2-7

TABLE OF CONTENTS - (Continued)

SECTION III
CIRCUIT DESCRIPTION

<u>Paragraph</u>		<u>Page</u>
3.1	Introduction	3-1
3.2	General Description	3-1
3.2.1	RF Conversion Section	3-1
3.2.1.1	RF Conversion Section Functions	3-1
3.2.1.2	Input/Output Signal Interfaces	3-3
3.2.2	IF/Demodulator Section	3-3
3.2.2.1	IF/Demodulator Section Functions	3-3
3.2.2.2	Input/Output Signal Interfaces	3-4
3.2.3	Synthesizer Section	3-5
3.2.3.1	Synthesizer Section Functions	3-5
3.2.3.2	Input/Output Signal Interfaces	3-5
3.2.4	Digital Control Section	3-6
3.2.4.1	Digital Control Section Functions	3-6
3.2.4.2	Input/Output Signal Interfaces	3-6
3.2.4.2.1	Digital Interface Input/Output	3-6
3.2.5	Power Supply Section	3-7
3.3	Receiver Functional Description	3-7
3.3.1	Input Filter Converter (A3)	3-7
3.3.2	IF/Demodulator Section	3-9
3.3.2.1	2.1755 MHz/455 kHz Converter (A4A1)	3-9
3.3.2.2	IF Filters 1-5 (A4A2-A4A6) (Bandwidths Customer Selected)	3-9
3.3.2.3	455 kHz IF Amplifier (A4A7)	3-9
3.3.2.4	Wideband/Narrowband Filter (A4A8)	3-9
3.3.2.5	AM/FM/SSB Demodulator (A4A9)	3-11
3.3.2.6	AGC/Video/Squelch (A4A10)	3-11
3.3.3	Synthesizer Section	3-11
3.3.3.1	Reference Divider (A5A1)	3-11
3.3.3.2	1st LO Synthesizer (A5A2)	3-11
3.3.3.3	2nd LO Synthesizer (A5A3)	3-13
3.3.3.4	BFO Synthesizer (A5A4)	3-13
3.3.4	Digital Control Section	3-13
3.3.4.1	Digital Interface (A6)	3-14
3.3.5	Power Supply Section	3-15
3.3.5.1	Voltage Regulator Module (A1)	3-15

TABLE OF CONTENTS - (Continued)

SECTION IV
MAINTENANCE

<u>Paragraph</u>		<u>Page</u>
4.1	General	4-1
4.2	Module Access	4-1
4.3	Preventive Maintenance	4-1
4.3.1	Visual Inspection	4-2
4.3.2	Cleaning	4-2
4.4	Receiver Performance Tests	4-3
4.4.1	General	4-3
4.4.2	Minimum Performance Standards.	4-3
4.4.3	Test Equipment Required	4-4
4.4.4	Procedure Guidelines	4-5
4.4.5	IF Gain Test	4-5
4.4.6	Detection Mode Test	4-7
4.4.7	Signal-To-Noise Ration (SNR) Test	4-9
4.4.8	Gain Control Test	4-9
4.4.9	Frequency Tuning Accuracy Test	4-11
4.5	Receiver Troubleshooting Procedures	4-14
4.5.1	General	4-14
4.5.2	Troubleshooting Guidelines	4-14
4.6	Receiver Alignment Procedures	4-18
4.6.1	General	4-18
4.6.2	Input Filter Converter Alignment	4-18
4.6.3	IF Gain Alignment	4-20
4.6.4	FM Discriminator Alignment	4-22
4.6.5	Signal Strength Full Scale Output Alignment	4-24
4.6.6	D/A Converter Output Alignment	4-26
4.6.7	1st LO Synthesizer Alignment	4-26
4.6.8	2nd LO Synthesizer Alignment	4-27
4.6.9	BFO Synthesizer Alignment	4-28

SECTION V
REPLACEMENT PARTS LIST

<u>Paragraph</u>		<u>Page</u>
5.1	Unit Numbering Method.	5-1
5.2	Reference Designation Prefix	5-1

TABLE OF CONTENTS - (Continued)

SECTION V

REPLACEMENT PARTS LIST - Cont'd

<u>Paragraph</u>		<u>Page</u>
5.3	List of Manufacturers	5-1
5.4	Parts List	5-4
5.5	Type WJ-8625-1 VLF Receiver, Main Chassis	5-5
5.5.1	Type 271153-1 Voltage Regulator Motherboard	5-6
5.5.1.1	Type 764009-1 Voltage Regulator Assembly	5-7
5.5.2	Type 794613-1 Input Converter Power Supply	5-8
5.5.3	Type 794614-1 Input Filter Converter	5-9
5.5.3.1	Part 371717-1 Input Converter	5-10
5.5.3.2	Part 371718-1 1st IF/AGC	5-12
5.5.4	Type 794598-1 IF Demodulator Motherboard	5-13
5.5.4.1	Type 794586-1 2.1755 MHz/455 kHz Converter	5-14
5.5.4.2	Type 370817-1 455 kHz IF Amplifier	5-16
5.5.4.3	Type 370816-1 Wideband/Narrowband Filter	5-17
5.5.4.4	Type 794599-1 AM/FM/SSB Demodulator Assembly	5-18
5.5.4.5	Type 794607-1 AGC/Video/Squelch Assembly	5-21
5.5.5	Type 794414-2 Synthesizer Motherboard	5-24
5.5.5.1	Type 794588-1 Reference Divider	5-25
5.5.5.2	Type 794593-1 1st LO Synthesizer	5-26
5.5.5.2.1	Type 794589-1 Phase Lock Loop	5-27
5.5.5.2.2	Type 794594-1 VCO Assembly	5-29
5.5.5.2.2.1	Part 371693-1 VCO	5-30
5.5.5.3	Type 794590-1 2nd LO Synthesizer Assembly	5-32
5.5.5.4	Type 794416-2 BFO Synthesizer	5-38
5.5.6	Type 794600-1 Digital Interface	5-41
5.5.7	Type 271134-1 LED Flexible Board	5-44

LIST OF ILLUSTRATIONS

<u>Figure</u>		<u>Page</u>
SECTION I		
1-1	WJ-8625-1 VLF Receiver	1-0
1-2	WJ-9040 System Configuration	1-3
1-3	Typical Sensitivity Curves	1-7

TABLE OF CONTENTS - (Continued)

LIST OF ILLUSTRATIONS - Cont'd

<u>Figure</u>		<u>Page</u>
SECTION II		
2-1	Receiver Rear Panel Input/Output Connectors	2-3
2-2	Receiver Front Panel Indicators	2-5
SECTION III		
3-1	Simplified Overall Block Diagram	3-2
3-2	RF Conversion Block Diagram	3-8
3-3	IF/Demodulator Block Diagram	3-10
3-4	Synthesizer Block Diagram	3-12
3-5	Digital Control Block Diagram	3-13
3-6	External Controller Interface	3-16
3-7	Power Supply Block Diagram	3-16
SECTION IV		
4-1	IF Gain Test Equipment Setup	4-6
4-2	Detection Mode Test Equipment Setup	4-8
4-3	SNR Test Equipment Setup	4-10
4-4	Gain Control Test Equipment Setup	4-12
4-5	Frequency Tuning Accuracy Test Equipment Setup	4-13
4-6	Input Converter Adjustment Equipment Setup	4-19
4-7	IF Gain Adjustment Equipment Setup	4-20
4-8	FM Discriminator Adjustment Equipment Setup	4-22
4-9	Signal Strength Full Scale Output Adjustment Equipment Setup	4-25
SECTION VI		
6-1	Type 271153-1 Voltage Regulator (A1A1), Schematic Diagram 370950	6-3
6-2	Type 794613-1 Input Converter Power Supply (A2), Schematic Diagram 471402	6-5
6-3	Type 794614-1 Input Filter Converter (A3), Schematic Diagram 471403	6-7
6-4	Type 794598-1 IF Demodulator Motherboard (A4), Schematic Diagram 470590	6-9
6-5	Type 794586-1 2.1755 MHz/455 kHz Converter (A4A1), Schematic Diagram 471334	6-11

TABLE OF CONTENTS - (Continued)

LIST OF ILLUSTRATIONS - Cont'd

<u>Figure</u>		<u>Page</u>
SECTION VI - (cont'd)		
6-6	Type 370817-1 455 kHz IF Amplifier (A4A7), Schematic Diagram 470688	6-13
6-7	Type 370816-1 Wideband/Narrowband Filter (A4A8), Schematic Diagram 470686	6-15
6-8	Type 794599-1 AM/FM/SSB Demodulator (A4A9), Schematic Diagram 471053	6-17
6-9	Type 794607-1 AGC/Video/Squelch (A4A10), Schematic Diagram 471377	6-19
6-10	Type 794414-2 Synthesizer Motherboard (A5), Schematic Diagram 570418	6-21
6-11	Type 794588-1 Reference Divider (A5A1), Schematic Diagram 471333	6-23
6-12	Type 794593-1 1st LO Synthesizer (A5A2), Schematic Diagram 471324	6-25
6-13	Type 794594-1 VCO Assembly (A5A2A2), Schematic Diagram 471325	6-27
6-14	Type 794590-1 2nd LO Synthesizer (A5A3), Schematic Diagram 670072	6-29
6-15	Type 794416-2 BFO Synthesizer (A5A4), Schematic Diagram 570417	6-31
6-16	Type 794600-1 Digital Interface (A6), Schematic Diagram 471376	6-33
6-17	Type 271134-1 LED Flexible Board (A7), Schematic Diagram 271135	6-35
6-18	Type WJ-8625-1 VLF Receiver Main Chassis, Schematic Diagram 471335	6-37

TABLE OF CONTENTS - (Continued)

LIST OF TABLES

<u>Table</u>		<u>Page</u>
SECTION I		
1-1	WJ-8625-1 VLF Receiver Specifications	1-5
1-2	IF Bandwidth Options and Sensitivity Levels	1-6
SECTION III		
3-1	72-Bit Receiver Parameter Data Word	3-14
SECTION IV		
4-1	Preventive Maintenance Schedule	4-1
4-2	Receiver Minimum Performance Standards	4-3
4-3	Test Equipment Required	4-4
4-4	WJ-8625-1 VLF Receiver Troubleshooting Chart	4-15
4-5	VCO Alignment Procedures	4-27

FIGURE 1-1

WJ-8625-1 VLF RECEIVER

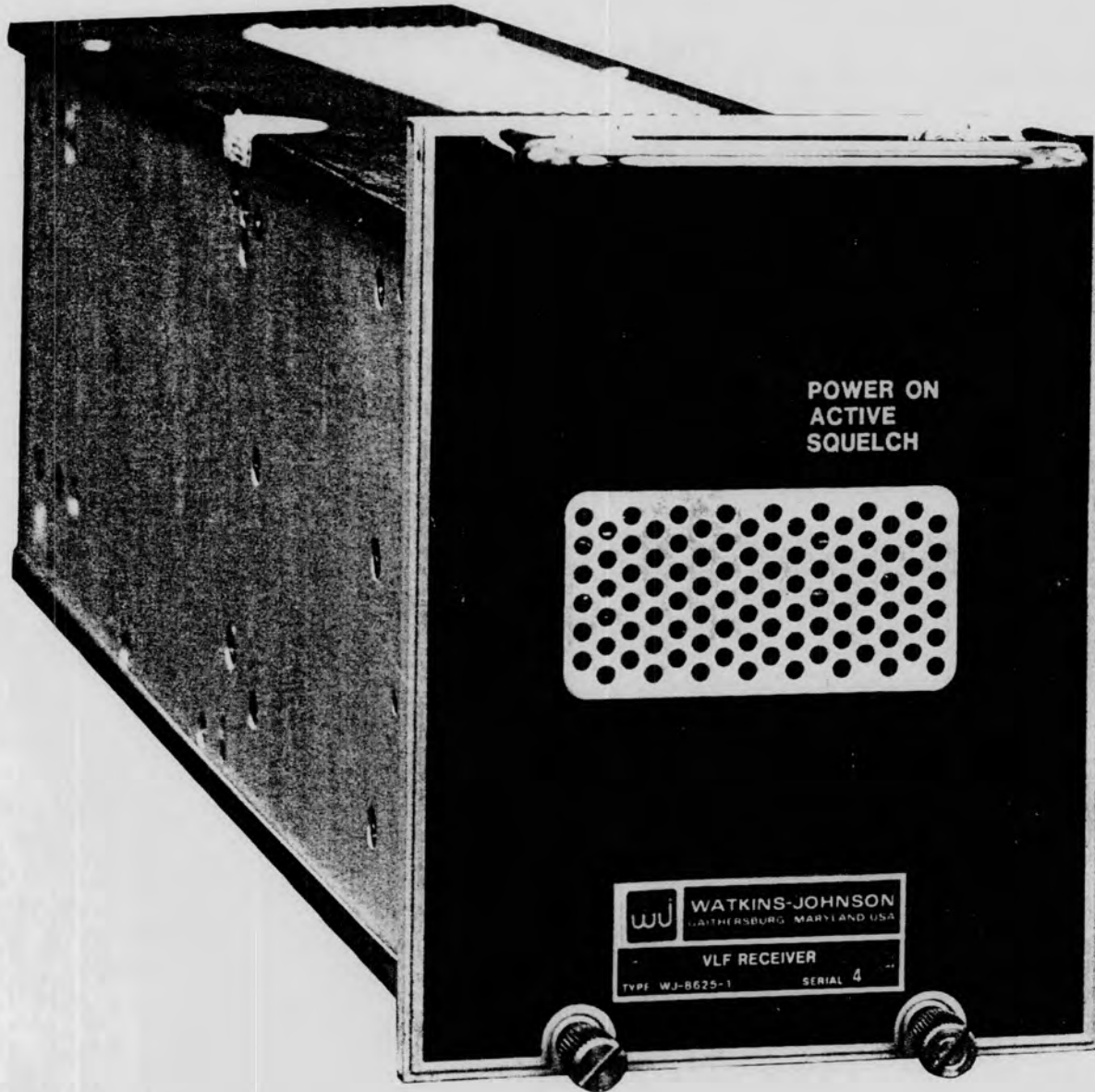


Figure 1-1. WJ-8625-1 VLF Receiver

SECTION I

GENERAL DESCRIPTION

1.1 ELECTRICAL CHARACTERISTICS

The WJ-8625-1 VLF Receiver (Figure 1-1) is a fully synthesized, microprocessor-controlled VLF receiver that operates in the frequency range of 200 Hz to 1.5 MHz, tunable to 0 Hz. The receiver is compatible with the WJ-9040 Receiving System Family, functioning as a slave receiver. The receiver shares the WJ-9040 System characteristics of low power consumption, modular construction and high performance. The WJ-8625-1 operates in the remote control mode only. Variable tuning resolution to 1 Hz is provided by phase lock loop frequency synthesizers stabilized by a 50 MHz reference frequency normally provided by an FRM150 or SRM105A Module located in the WJ-9040 EFR100 Equipment Frame.

The WJ-8625-1 can demodulate AM, FM, CW, USB and LSB signals. Five selectable IF bandwidths are available from 100 Hz to 16 kHz. SSB detection is achieved with a 2.85 kHz BW filter in conjunction with offset local oscillators. This filter also acts as one of the five selectable IF bandwidths for AM, FM, or CW detection. In cases where optimum carrier rejection performance is critical, separate USB and LSB filters can be installed leaving three remaining choices for other IF bandwidths.

1.2 MECHANICAL CHARACTERISTICS

The receiver is normally mounted in a 19-inch WJ-9040 System EFR100 Equipment Frame and occupies one quarter the width of the frame. The main chassis, front, rear, top and internal compartment panels are constructed of aluminum. The side panels are cast aluminum, the front is a 0.19 inch thick aluminum plate and the rear panel, main deck and internal partitions are stamped aluminum. All indicators are located on the front panel, while all input and output lines are routed through the rear panel.

The front panel is overlaid with a black bezel etched with status markings. Three LEDs illuminate through different color lenses. The rear panel mounts all input and output connectors. A 25-pin D series connector interfaces the required control I/O, DC supply voltages and Polled I/O signals between the receiver and the EFR100 Equipment Frame. Five SMA coaxial connectors interface the RF input, 50 MHz Reference input, Signal Monitor, selected Video, and IF outputs, and a nine-pin SRE series connector interfaces the auxiliary output signals.

GENERAL DESCRIPTION

WJ-8625-1 VLF RECEIVER

1.2 MECHANICAL CHARACTERISTICS - (Continued)

Removing six screws allows the top cover to be lifted from the receiver exposing four main compartments. The input converter is housed in a steel enclosure. The four synthesizers are mounted in a partitioned compartment, while the IF assemblies and the digital control are each in separate compartments for mechanical support and shielding.

Removing the bottom cover via seven screws exposes two additional printed circuit assemblies and allows access to the three motherboards. Most of the interconnections are made with push-on multipin plugs.

1.3 OPERATIONAL OVERVIEW

The following paragraphs describe the WJ-9040 operational environment in terms of its interaction with the WJ-8625-1 VLF Receiver. Included are definitions of the hardware interface between the receiver and the WJ-9040 System and an overview of the data interchanges that occur.

1.3.1 BASIC SYSTEM ORGANIZATION

The WJ-8625-1 VLF Receiver is part of the WJ-9040 Receiving System Family and will typically be operated in a WJ-9040 System environment. The receiver is designed to plug into the WJ-9040 Equipment Frame. This frame defines the interface point between the receiver and the WJ-9040 System. The receiver receives all DC power, control instructions and commands via a 25-pin D type connector that mates with a counterpart on the equipment frame. The WJ-9040 System is designed to communicate with the receiver from two primary sources: from a WJ-9040 System Receiver Controller or from an external control device via an RS-232/IEEE-488 Interface. Both sources interface with the receiver through the IOM108 I/O Interface Module on the equipment frame. Actual communication with the receiver is via a 72-bit serial data stream from the IOM108. In addition, an FRM150 Frequency Reference Module or SRM105A Site Reference Module supply a 50 MHz signal to the receiver synthesizers. Figure 1-2 is a simplified block diagram showing the relationship between the major elements in the WJ-9040 System.

1.3.2 EQUIPMENT REQUIRED BUT NOT SUPPLIED

The following items are a minimum complement necessary to obtain use of the receiver if it is to be configured as a component in a WJ-9040 Receiving System.

- a. Up to Five WJ-9926A-XXXX IF Filter Assemblies
- b. EFR100 Equipment Frame
- c. WJ-862X-4 Receiver/Controller (If local control is required.)
- d. EPS Series Power Supply

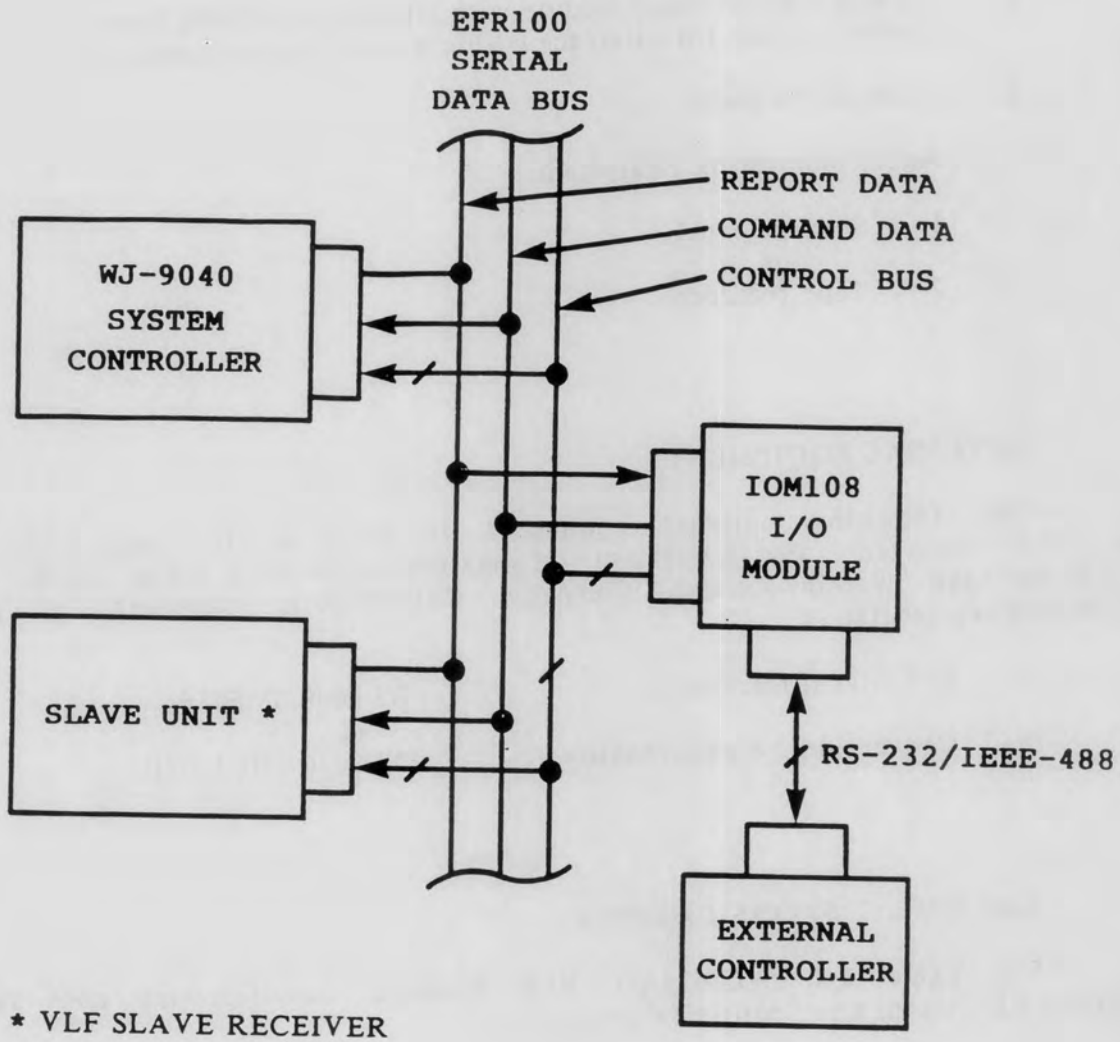


Figure 1-2. WJ-9040 System Configuration

GENERAL DESCRIPTION

WJ-8625-1 VLF RECEIVER

1.3.2 EQUIPMENT REQUIRED BUT NOT SUPPLIED - (Continued)

- e. SRM105A Site Reference Module
- f. IOM108 I/O Interface Module with DIO232 or DIO488 Interface
(necessary only for interface with external, remote controller)
- g. Antenna, 50 ohms
- h. Audio Monitoring Equipment:
 - 1. Speaker panel
or
 - 2. Tape recorder

1.3.3 OPTIONAL EQUIPMENT

The following optional equipment is available for use with the WJ-8625-1 VLF Receiver. For additional information concerning these options and others, contact the Watkins-Johnson Company, Gaithersburg, Maryland, or your Watkins-Johnson representative.

- | | |
|--------------------------------|-------------------|
| a. FFT Signal Monitor | WJ-9040 SMF455 |
| b. Conventional Signal Monitor | WJ-9040 SDU100/HF |

1.4 EQUIPMENT SPECIFICATIONS

See Table 1-1, WJ-8625A-1 VLF Receiver Specifications and Table 1-2, IF Bandwidth Options and Sensitivity Levels.

Table 1-1. WJ-8625-1 VLF Receiver Specifications

Tuned Frequency	200 Hz to 1.5 MHz
Tuning Resolution	1 Hz
Synthesizer Tuning Speed	15 ms, typical
Antenna Conducted Local Oscillator Radiation	-95 dBm maximum
Antenna Input Protection	The antenna input will withstand the effects of RF power to +27 dBm and static build-up. The protection circuit automatically resets.
Input Impedance	50 ohms, unbalanced, nominal
IF Bandwidths (3 dB)	Standard: 2.85 kHz; Optional: any four of the following: 0.1, 0.2, 0.5, 1, 2, 3, 4, 6, 8, 12 or 16 kHz; USB, LSB
Detection Modes	Standard: FM, AM, CW, LSB and USB
Gain Control Modes	Manual, AGC
AGC and Manual Range	90 dB, minimum
AGC Threshold	3.0 microvolt, typical
AGC Attack Time	15 ms, maximum
AGC Release Time	FAST = 100 ms, maximum; SLOW = 2-4 Sec., nominal
Synthesized BFO	+/- kHz in 100 Hz steps
IF Rejection	Greater than 65 dB
Image Rejection	Greater than 80 dB
Sensitivity	See Table 1-2 and Figure 1-3
IF Output	455 kHz, 20 mV into 50 , minimum, at 3 micro-volt input level, IF BW limited
Signal Monitor Output	455 kHz, center frequency, 17 kHz bandwidth, 50 , output impedance
Third Order Input Intercept Point	+10 dBm, minimum for signals separated by 20 kHz minimum
Video Amplifier Response	Within 3 dB from 20 Hz to 1/2 IF Bandwidth
Video Output Level	350 mV rms into 75 ohms
Video Distortion	Less than 5% total Harmonic Distortion in AGC or Manual Gain Modes
Signal Strength Output	Shaped DC AM Detector output, 0 to +10 Vdc
Squelch/COR.	Adjustable threshold from noise level to 80 dB above noise. COR holds a nominal 4 seconds after carrier disappears
Digital Control	72 Bit Serial Word (WJ-9040 System compatible)
Environmental Conditions: Temperature, Operating	0°C to +50°C
Size	5.2 inches (132 mm) high, 8.0 inches (203 mm) wide, and 14.38 inches (365 mm) deep
Weight	Approximately 17 lbs. (7.7 kg)
Power Consumption	Approximately 14 watts (From +8.2, +/-18.3, +29 Vdc)

TABLE 1-2

WJ-8625-1 VLF RECEIVER

Table 1-2. IF Bandwidth Options and Sensitivity Levels

	3 dB IF Bandwidth	IF Shape Factor (Typical) 50 dB: 3 dB	RF Input Level Microvolts dBm
WJ-9926A/200	200 Hz	10:1	0.50 -116
WJ-9926A/500	500 Hz	7:1	0.64 -114
WJ-9926A/1K	1 kHz	5:1	0.80 -112
WJ-9926A/2K	2 kHz	3:1	1.0 -110
WJ-9926A/3K	3 kHz	3:1	1.4 -107
WJ-9926A/4K	4 kHz	3:1	1.6 -106
WJ-9926A/6K	6 kHz	3:1	2.0 -104
WJ-9926A/8K	8 kHz	3:1	2.2 -103
WJ-9926A/12K	12 kHz	3:1	2.9 -101
WJ-9926A/16K	16 kHz	2:1	3.2 -100
WJ-9926A/USB	2.85 kHz	1.8:1	0.7 -113
WJ-9926A/LSB	2.85 kHz	1.8:1	0.7 -113
WJ-9926A/SSB (uses offset L.O.)	2.85 kHz	1.8:1	0.7 -113

NOTE: Over the frequency range of 200 Hz to 1.5 MHz, the RF input levels and IF Bandwidths specified above will:

1. Produce a minimum AM (S+N)/N ratio of 10 dB at the audio output for 50% AM modulation at a 400% Hz rate, (1 kHz and wider IF Bandwidths).
2. Produce a minimum CW (S+N)/N ratio of 16 dB at the audio output.
3. Produce a minimum FM (S+N)/N ratio of 17 dB at the audio output (10 kHz and wider IF Bandwidth).
4. Produce a minimum USB/LSB (S+N)/N ratio of 10 dB at the audio output (SSB Filters only).

NOTE: The IF Bandwidth must be less than 20% of the RF tuned frequency.

WJ-8625-1 VLF RECEIVER

FIGURE 1-3

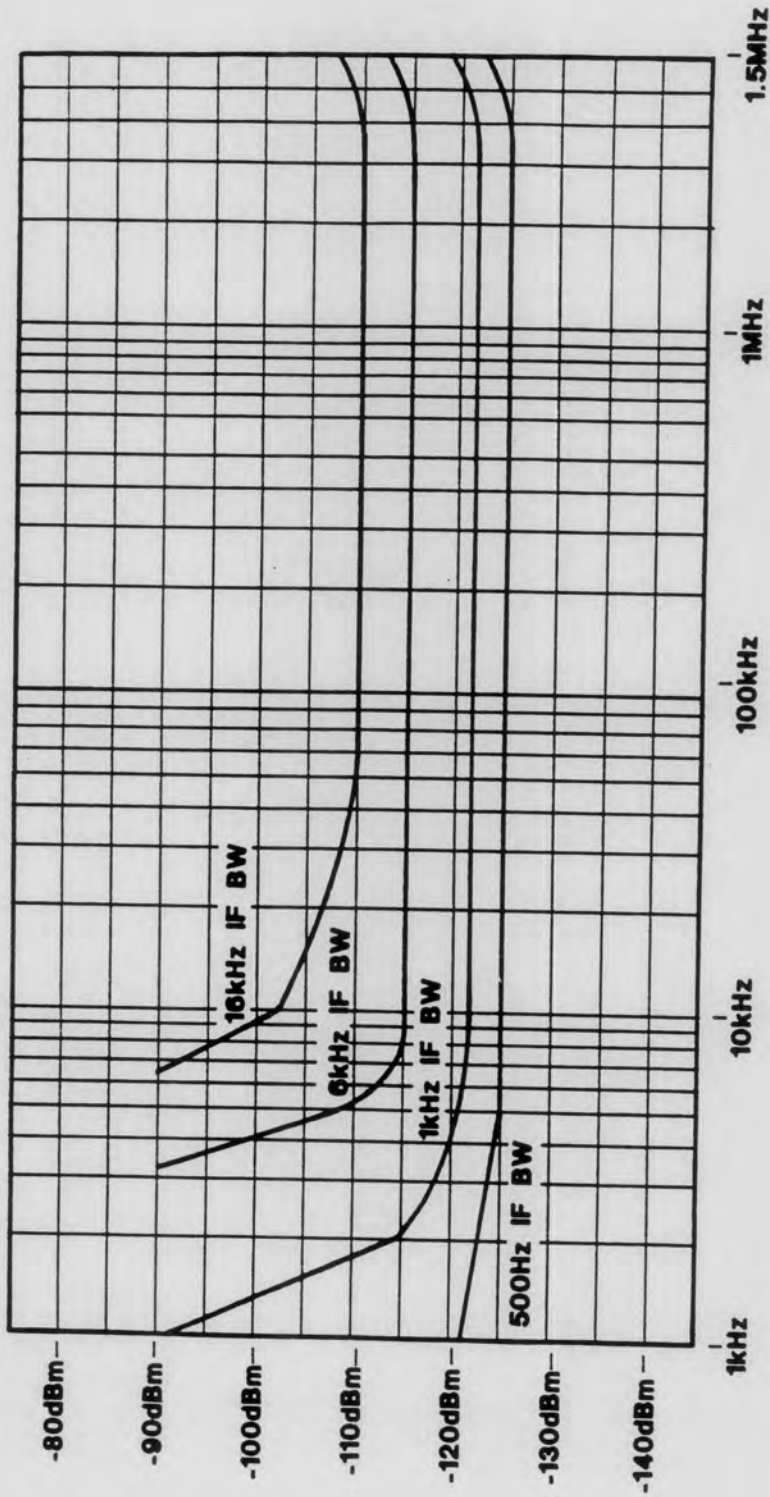
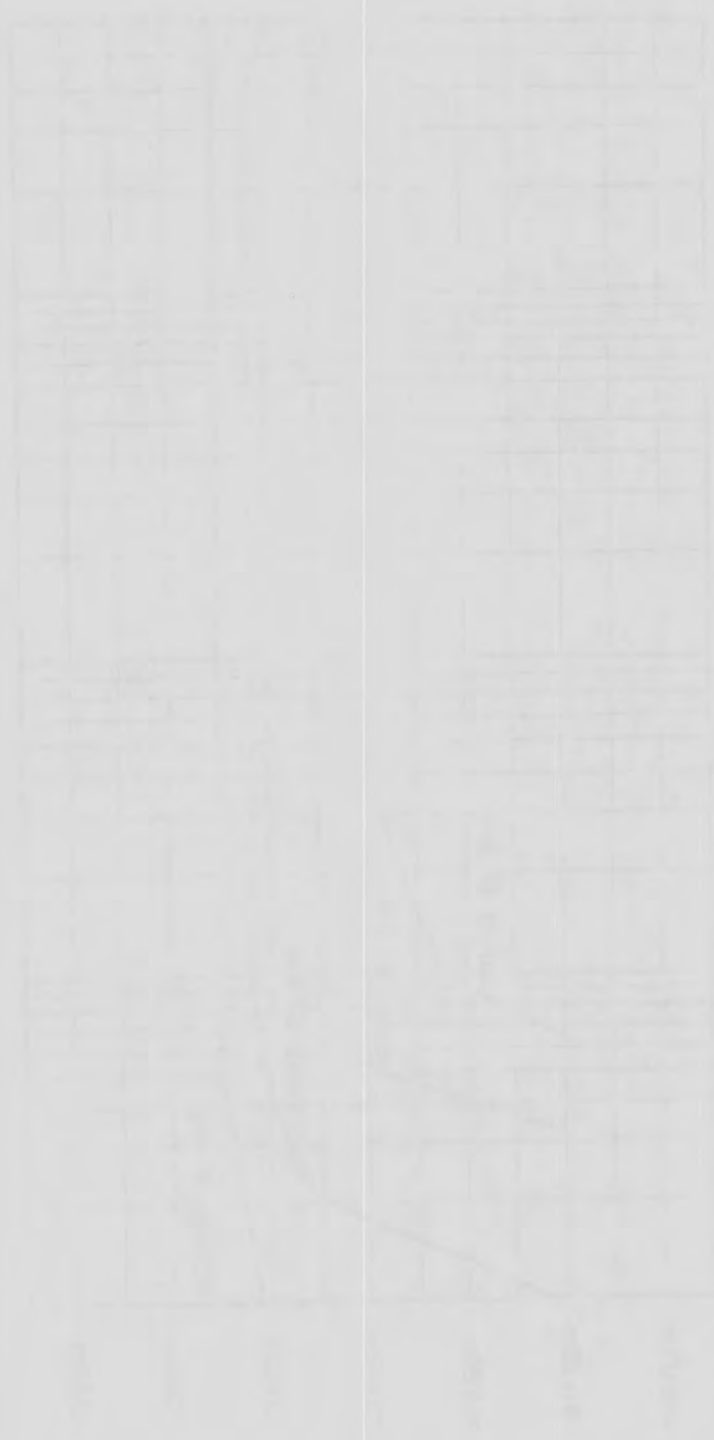


Figure 1-3. Typical Sensitivity Curves



SECTION II

INSTALLATION AND OPERATION

2.1 UNPACKING AND INSPECTION

Examine the shipping carton for damage prior to unpacking the equipment. If the carton appears to be damaged, have the carrier's agent present when the equipment is unpacked. If this is not possible, retain all packaging material and shipping containers for the carrier's inspection to verify damage to the equipment after unpacking. Also verify that the equipment shipped corresponds to the packing slip. Contact the Watkins-Johnson Company, CEI Division, or your Watkins-Johnson representative for any discrepancies or shortages.

The unit was thoroughly inspected and factory adjusted for optimum performance prior to shipment. It is, therefore, ready for use upon receipt. After uncrating and checking contents against the packing slip, visually inspect all exterior surfaces for dents and scratches. If external damage is visible, remove the dust covers and inspect the internal components for apparent damage. Then check the internal and external cables for loose connections, and plug-in items which may have been loosened from their receptacles.

2.2 REPACKING

If the equipment must be prepared for reshipment, the packing methods should follow the pattern established in the original shipment. If retained, the original materials can be reused to a large extent or at least provide guidance for the repackaging effort. Conditions during storage and shipment should be limited as follows:

Maximum Humidity:	95% (no condensation)
Temperature Range:	-40°C to +70°C

2.3 INSTALLATION PROCEDURES

The WJ-8625-1 VLF Receiver is designed to mount in the EFR100 Equipment Frame. Specific installation procedures for the EFR100 are covered in the WJ-9040 System Common Equipment Instruction Manual. However, the following general guidelines should be observed when using the receiver in the WJ-9040 Operational Environment:

1. Operating temperature range should be from 0°C to +50°C.

2.3 **INSTALLATION PROCEDURES - (Continued)**

2. Free air circulation should be allowed between equipment frames. Multiple stacking significantly increases ambient temperatures.
3. Use only stable, properly grounded AC power for the WJ-9040 equipment.
4. Secure the receiver in the frame by rotating the four front panel locking screws clockwise until tight.

2.3.1 **INPUT/OUTPUT CONNECTORS**

The receiver's input/output connectors are shown in Figure 2-1. These connectors are mounted on the receiver rear panel. The 25-pin D type connector (J1) mates with a counterpart in the EFR100 Equipment Frame to provide DC power and control signals to the receiver and status indication outputs. Five SMA female connectors provide signal input and output connections. A nine-pin SRE female connector (J6) provides auxiliary outputs from the demodulator. These connectors are described individually in the following paragraphs.

2.3.1.1 **Power, Command/Control (J1)**

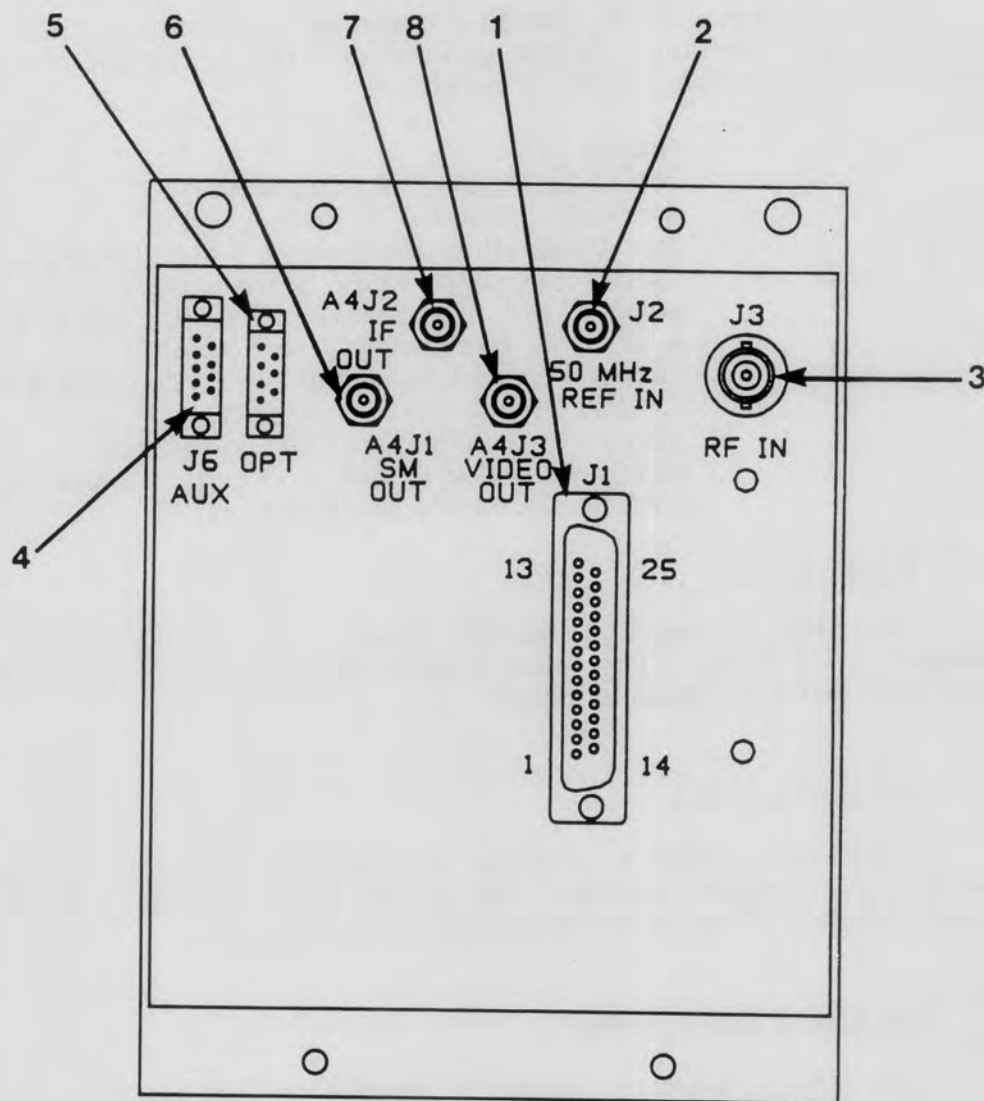
This 25-pin D type connector mates with any one of connectors (J1-J8) on the EFR100 to supply DC voltage and I/O command and control signals to the receiver. Status conditions, including signal strength, squelch status, tuning voltage and synthesizer lock, are polled by the IOM108 via this connector.

2.3.1.2 **50 MHz Reference Input (J2)**

This SMA connector must be connected to either (J1), (J2), (J3), or (J4) on the FRM150 or other highly stable 50 MHz signal (50 ohm, 0 dBm), to provide a reference for the receiver's synthesizers.

WJ-8625-1 VLF RECEIVER

FIGURE 2-1



- | | |
|--------------------------------|---------------------------------|
| 1. Power, Command/Control (J1) | 5. Option |
| 2. 50 MHz Reference Input (J2) | 6. SM Output (A4J1) |
| 3. RF Input (J3) | 7. 455 kHz IF Output (A4J2) |
| 4. Auxiliary Output (J6) | 8. Selected Video Output (A4J3) |

Figure 2-1. Rear Receiver Panel Input/Output Connectors

INSTALLATION AND OPERATION

WJ-8625-1 VLF RECEIVER

2.3.1.3 Auxiliary Output (J6)

This nine-pin SRE female connector provides outputs from the receiver's Demodulator Section. These outputs are for connection to user-selected interface devices. The pin assignments are as follows:

- A - Ground
- B - FM Audio Output (5 k impedance)
- C - AM Audio Output (5 k impedance)
- D - Signal Strength Output (analog 0 to +10 Vdc 10 mA)
- E - Carrier Operated Relay (open collector, 30 mA sink to ground, +24 Vdc max) (remains active four seconds after signal drops below COS threshold)
- F - Carrier Operated Squelch (0 or +5 Vdc CMOS driver)
- H - CW/SSB Output (5 k impedance)
- J - Squelched Audio Output (600 impedance)
- K - Slideback Voltage Input (Reverse biases AM detector diode to extend AM detection range)

2.3.1.4 RF Input (J3)

This SMA connector is the RF signal input for the receiver. Nominal input impedance is 50 ohms. The input is protected against RF power levels up to +27 dBm (500 milliwatts) and static buildup.

2.3.1.5 SM Output (A4J1)

This SMA connector provides a broadband 455 kHz IF output signal suitable for driving a signal monitor. The signal occupies a 17 kHz bandwidth at a level of approximately 25 dB above the receiver input level.

2.3.1.6 455 kHz IF Output (A4J2)

This SMA connector supplies a bandwidth limited 455 kHz IF output signal. The level will be 20 mV minimum into 50 ohms in AGC mode, for RF input signals greater than 3 microvolts.

2.3.1.7 Selected Video Output (A4J3)

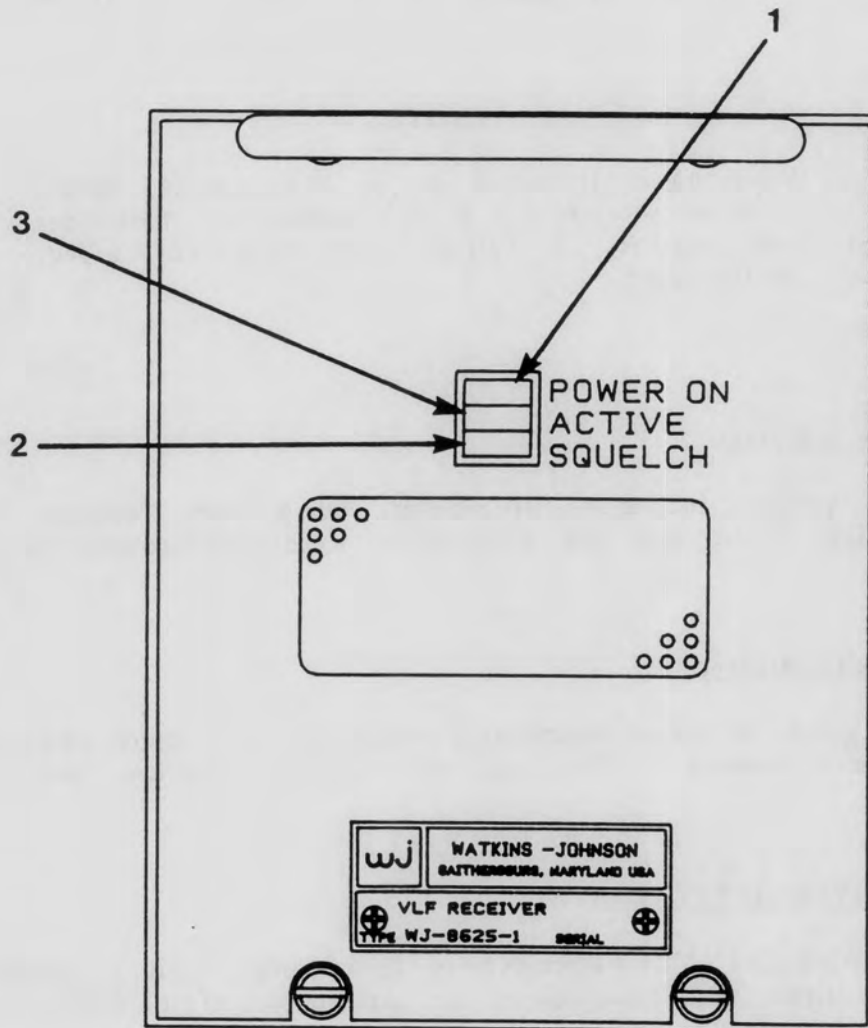
This SMA connector supplies a bandwidth limited video output signal from the AM, FM, CW or SSB detector as selected. The AC coupled signal has a bandwidth from 20 Hz to one-half the IF bandwidth at a level of 350 mV rms into 75 ohms.

2.3.2 CONTROLS AND INDICATORS

The purpose and function of the front panel indicators are explained in the following paragraphs. Refer to Figure 2-2.

WJ-8625-1 VLF RECEIVER

FIGURE 2-2



- 1. POWER ON/Unlock Indicator
- 2. SQUELCH Indicator

- 3. ACTIVE Indicator

Figure 2-2. Receiver Front Panel Indicators

INSTALLATION AND OPERATION

WJ-8625-1 VLF RECEIVER

2.3.2.1 Power/Unlock Indicator

This red lamp is illuminated and steady when power is applied and synthesizers are locked. The lamp flashes at approximately 1 Hz if an unlock condition occurs.

NOTE

When power is turned on, it is normal to require 5 to 10 seconds for a lock condition. This does not indicate a failure and does not affect tuning speed.

2.3.2.2 Active Indicator

This yellow indicator illuminates when the receiver has been activated for Polled Audio by the companion Receiver/Controller or computer terminal.

2.3.2.3 Squelch Indicator

This green indicator illuminates when the RF input signal level has exceeded the squelch setting. The receiver's squelched audio output becomes active.

2.4 RECEIVER OPERATION

The WJ-8625-1 VLF Receiver is operational from a remote control device only. No direct local procedures are applicable after proper installation is completed.

2.4.1 OPERATION FROM A MASTER RECEIVER/RECEIVER CONTROLLER

The WJ-9040 System may be configured with one or more Master Receiver/Receiver controllers such as the WJ-8625-1 equipped with the Master Handoff (MH Option).

The WJ-8625-1 accepts control signals from the Master Receiver via the IOM108 and EFR100. All receiver parameters and functions (except scanning) are directly controllable from the Master front panel, while signal strength and tuning indicators are returned from the WJ-8625-1.

Complete installation and detailed operating instructions are found in the specific Master Receiver Instruction Manual.

2.4.2 OPERATION FROM A COMPUTER TERMINAL

The minimum equipment configuration for implementing remote control by an ASCII type computer terminal consists of a computer terminal equipped for either IEEE-488 or RS-232 communication, an EFR100 Equipment Frame, an IOM108 I/O Interface Module (equipped for either IEEE-488 or RS-232 communication), and a WJ-8625-1 VLF Receiver. Using English-like ASCII commands, the controller communicates directly with the IOM108 which decodes the commands and communicates with the receiver via the command/report data lines on the rear panel at connector (J1). Additionally, the receiver reports to the controller via the polled I/O lines on rear panel connector (J1) through the IOM108. Detailed information for implementing remote control via the IEEE-488 or RS-232 interfaces may be found in the **WJ-9040 System Common Equipment Instruction Manual**.

The following information is for your information only. It is not intended to be used as a substitute for professional advice. The information is provided as a service to our members and is not intended to be used as a substitute for professional advice. The information is provided as a service to our members and is not intended to be used as a substitute for professional advice.

The following information is for your information only. It is not intended to be used as a substitute for professional advice. The information is provided as a service to our members and is not intended to be used as a substitute for professional advice. The information is provided as a service to our members and is not intended to be used as a substitute for professional advice.

SECTION III

CIRCUIT DESCRIPTION

3.1 INTRODUCTION

This section describes the theory of operation of the receiver. A receiver simplified block diagram is provided to show overall functional partitioning of the receiver. Functional block diagrams are provided for each of the receiver's major sections to show functional signal flow through the receiver. The functional descriptions are followed by individual circuit-level descriptions of each receiver module.

3.2 GENERAL DESCRIPTION

Figure 3-1 is a simplified block diagram of the receiver. Also refer to Figure 6-18, WJ-8625-1 Main Chassis Schematic Diagram and other individual schematics as necessary during the following circuit descriptions. The receiver functions have been grouped into the following five sections:

1. RF Conversion Section
2. IF/Demodulator Section
3. Synthesizer Section
4. Digital Control Section
5. Power Supply Section

A general discussion of each of these sections follows.

3.2.1 RF CONVERSION SECTION

A general description of the RF Conversion Section functions and signal interfaces provided in the following paragraphs.

3.2.1.1 RF Conversion Section Functions

The RF Conversion Section performs the following functions:

- a. Frequency Translation - The selected portion of the incoming RF spectrum is translated to the 2.176 MHz 1st IF by a single conversion process using a 1st LO tuned from 2.176 MHz to 3.676 MHz.

FIGURE 3-1

WJ-8625-1 VLF RECEIVER

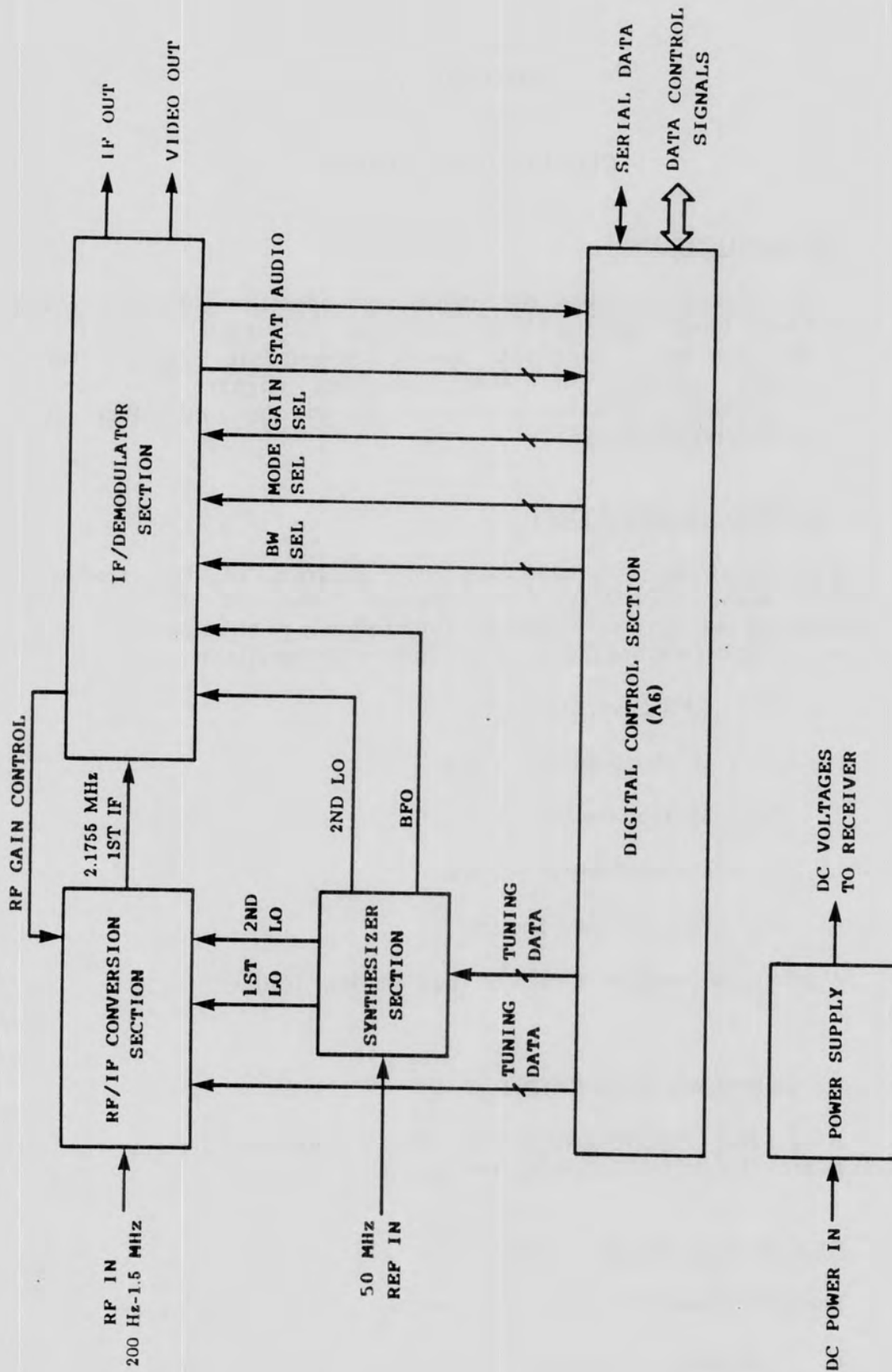


Figure 3-1. WJ-8625-1 VLF Receiver Simplified Block Diagram

3.2.1.1 RF Conversion Section Functions - (Continued)

- b. Bandlimiting - The bandwidth of the 2.176 MHz 1st IF output is limited to 17 kHz by a crystal bandpass filter.
- c. Gain Control - Under high input signal conditions, the overall gain of the RF Conversion Section is reduced to prevent overloading or saturation of succeeding receiver sections.

3.2.1.2 Input/Output Signal Interfaces

Section: The following input/output signals interface with the RF Conversion

- a. RF Input - Rear panel J3 feeds broadband 200 Hz - 1.5 MHz RF signals from an antenna or similar source into the receiver at a 50 ohm impedance. This input is protected against RF levels exceeding +15 dBm.
- b. 1st LO - The Synthesizer Section sends the 1st LO signal, 2.176-3.676 MHz, to operate the 1st Mixer.
- c. 1st IF Output - The 2.1755 MHz 1st IF output is provided as an input to the IF/Demodulator Section. This output is 50 ohms at 17 kHz bandwidth and is nominally 15 dB above the RF input signal level.

3.2.2 IF/DEMODULATOR SECTION

A general description of the IF/Demodulator Section functions and signal interfaces is provided in the following paragraphs.

3.2.2.1 IF/Demodulator Section Functions

The IF/Demodulator Section performs the following functions:

- a. Frequency Translation - The 2.1755 MHz 1st IF input signal is translated to the 455 kHz 2nd IF by a single conversion process.
- b. Bandlimiting - The 2nd IF signal is routed through one of five selectable IF filters. Available bandwidths range from 100 Hz to 16 kHz.
- c. IF Amplification - A two stage, high gain, 2nd IF Amplifier provides the major portion of overall receiver gain.

CIRCUIT DESCRIPTION

WJ-8625-1 VLF RECEIVER

3.2.2.1 IF/Demodulator Section Functions - (Continued)

- d. Gain Control - An AGC detector provides primary gain control to the 2nd IF Amplifier under normal signal conditions, and secondary gain control to the RF Conversion Section under high signal conditions.
- e. Signal Demodulation - Three signal demodulators provide demodulated AM, FM and CW/SSB video outputs.

3.2.2.2 Input/Output Signal Interfaces

Section: The following input/output signals interface with the IF/Demodulation

- a. 1st IF Input - The RF Conversion Section sends the 2.1755 MHz 1st IF input signal. Signal bandwidth is 17 kHz and input impedance is 50 ohms.
- b. 2nd LO - The Synthesizer Section sends the 2nd LO signal, 1.720-1.721 MHz, to operate the 2nd Mixer.
- c. SM - A medium level 2nd IF signal at approximately 25 dB above the RF input level. The bandwidth is 17 kHz.
- d. BFO - The Synthesizer sends the BFO signal, 447-463 kHz, to operate the CW/SSB Detector.
- e. BW Select - The Digital Control Section sends a 5-bit data word to select each of the five 2nd IF Filters.
- f. Mode Select - The Digital Control Section sends a 3-bit data word to select AM, FM or CW/SSB Modes. When any SSB Mode is selected, an appropriate SSB 2nd IF Filter is selected via the BW select data word.
- g. Gain Select - The Digital Control Section sends a 2-bit data word to select SLOW, FST or MAN gain modes. In MAN Mode, the Digital Control Section also sends a MAN GAIN voltage to directly control the gain of the 2nd IF Amplifier.
- h. IF Out - A high level, 2nd IF signal is provided as a rear panel receiver output. This output is 50 ohms, bandwidth limited by the 2nd IF Filter, and is nominally 67 dB above the 1st IF input signal.
- i. Video Output - A demodulated AM, FM or CW/SSB signal is provided as a rear panel receiver output. This output is 75 ohms, 1/2 the 2nd IF Filter bandwidth, and is nominally 1 Vpp or greater.

3.2.2.2 Input/Output Signal Interfaces - (Continued)

- j. RF Gain Control - This DC voltage is supplied to the RF Conversion Section. The level is nominally 0 Vdc under normal signal conditions, increasing to -5 Vdc under maximum signal conditions.
- k. Status - These DC outputs are sent to the Digital Control Section and represent the status of COS, Signal Strength, AFC, and the IF bandwidth identification voltage.
- l. Audio - This low level audio is sent to the Digital Control for distribution to the front panel and rear panel I/O connector.

3.2.3 SYNTHESIZER SECTION

A general description of the Synthesizer Section functions and signal interfaces is provided in the following paragraphs.

3.2.3.1 Synthesizer Section Functions

The Synthesizer Section performs the following functions:

- a. LO Signal Generation - The Synthesizer Section translates digital tuning data into the 1st, 2nd, and BFO signals required for operation of the mixers in the RF Conversion and IF/Demodulation Sections.
- b. External Reference Locking - Internal phase locked loops lock the accuracy of the four LO signals to an external frequency reference source.

3.2.3.2 Input/Output Signal Interfaces

Section: The following input/output signals interface with the Synthesizer

- a. 50 MHz Ref. In - Rear panel (J2) provides the input for a high stability 50 MHz reference signal. This signal is a sine wave into 50 ohms at 0 dBm nominal level and determines the effective tuning accuracy of the receiver.
- b. Tuning Data - The Digital Control Section sends 9 BCD encoded tuning data words to program the output frequencies of the 1st, 2nd, and BFO Synthesizers.

CIRCUIT DESCRIPTION

WJ-8625-1 VLF RECEIVER

3.2.3.2 Input/Output Signal Interfaces - (Continued)

- c. 1st LO - The 1st LO output is provided as an input to the RF Conversion Section. Frequency range is 2.176-3.676 MHz and level is 0 dBm nominal into 50 ohms.
- d. 2nd LO - The 2nd LO output is provided as an input to the IF/Demodulator Section. Frequency range is 1.721-1.720001 MHz and level is 0 dBm nominal into 50 ohms.
- e. BFO - The BFO signal output is provided as an input to the IF/Demodulation Section. Frequency range is 447-463 kHz and level is 40 mVrms (high impedance).

3.2.4 DIGITAL CONTROL SECTION

A general description of the Digital Control Section functions and signal interfaces is provided in the following paragraphs.

3.2.4.1 Digital Control Section Functions

The Digital Control Section performs the following functions:

- a. External Controller Interface - External controller commands are interfaced to the digital circuitry to generate receiver digital control words.
- b. Sends receiver status words to the external controller. This would typically be an IOM108 connected through the backplane of an EFR100 Equipment Frame.
- c. Provides dynamic outputs to the IOM108 through a polling sequence.

3.2.4.2 Input/Output Signal Interfaces

3.2.4.2.1 Digital Interface Input/Output

- a. Tuning Data - A 34-bit synthesizer tuning data word is sent to the Synthesizer Section.
- b. IF/Demodulator Select Data - A 5-bit BW select word, a 3-bit Detection Mode select word and a 2-bit Gain select word are sent to the IF/Demodulator Section.

3.2.4.2.1 **Digital Interface Input/Output - (Continued)**

- c. Status - DC voltages representing the status of COS, Signal Strength, AFC and selected IF bandwidth are sent from the IF Demodulator Section to the I/O Control Section.
- d. Audio - Low level audio is sent from the IF/Demodulator Section to the I/O Control Section for distribution to the front panel and rear panel I/O connector.
- e. Status Input - A 72-bit serial data stream containing the codes for all receiver parameters is received from the I/O Control Section. A clock, strobe, and enable line control the flow of data.
- f. I.D. Output - A 16-bit serial data stream is sent to the I/O Control Section containing the IF BW identification, and any option IDs if present.

3.2.5 **POWER SUPPLY SECTION**

The Power Supply Section receives DC input voltages from rear panel connector (J1) and converts these voltages to DC level required by the receiver circuits. Module A1 regulates for the receiver section as shown below.

- a. Input: +29 V, +18 V, -18 V, +8 V
- b. Output: +29 V, +15 V, -15 V, +5 V

3.3 **RECEIVER FUNCTIONAL DESCRIPTION**

Figure 3-2 is a block diagram of the RF Conversion Section.

3.3.1 **INPUT FILTER CONVERTER (A3)**

RF signals from receiver rear panel (J3) drive the RF input of the Input Filter Converter (A3). The RF input signals are bandlimited to 1.5 MHz by an eleven pole lowpass filter on (A3A1), with a 50 characteristic impedance and 1 dB insertion loss. The RF input signals are then amplified and sent to the 1st Mixer where they are mixed with the 1st LO to produce the 1st IF signal of 2.1755 MHz. The 1st IF signal is then sent to the 1st IF/AGC board (A3A2), where the signal is passed through a bandpass filter centered at 2.1755 MHz with a 17 kHz bandwidth and drives the 1st IF/AGC Amplifier. The output of the Input Filter Converter (A3) drives the 1st IF input of the IF/Demodulator Section.

FIGURE 3-2

WJ-8625-1 VLF RECEIVER

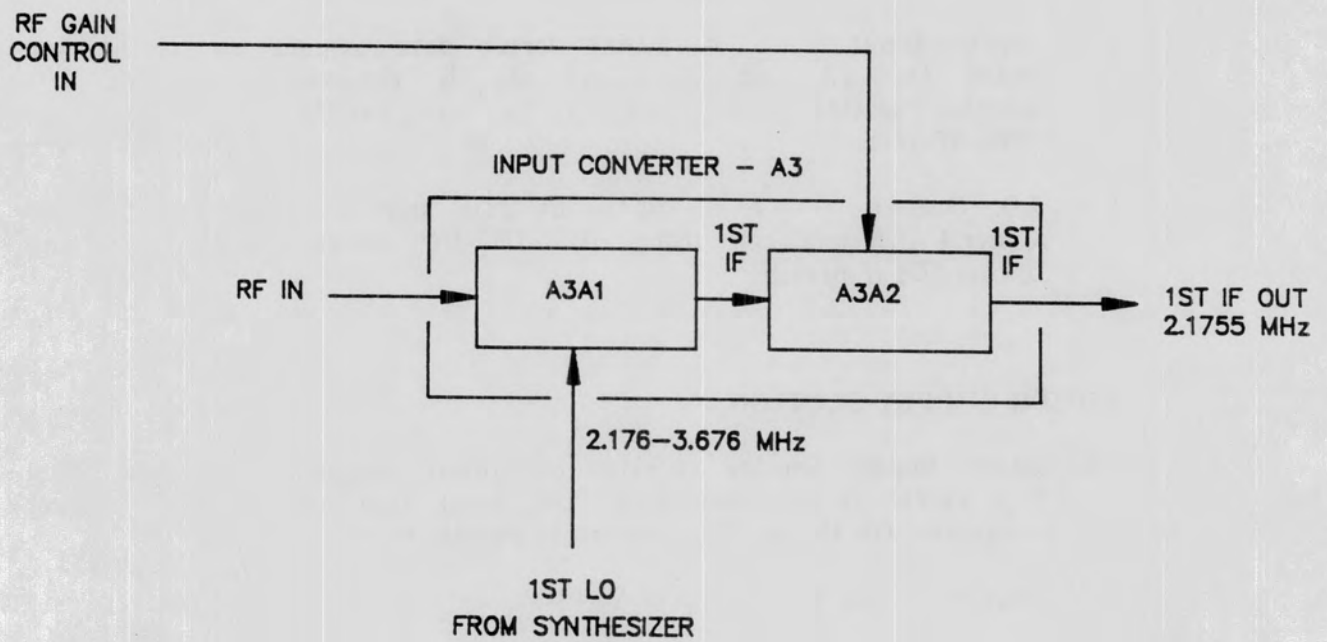


Figure 3-2. RF Conversion Block Diagram

3.3.2 IF/DEMODULATOR SECTION

Figure 3-3 is a block diagram of the IF/Demodulator Section. As shown in Figure 3-3, the IF/Demodulator consists of ten major modules: 2.1755 MHz/455 kHz Converter (A4A1); IF Filters (A4A2-A4A6); 455 kHz IF Amplifier (A4A7); Wideband/Narrowband Filter (A4A8); AM/FM/SSB Demodulator (A4A9); AGC/Video/Squelch (A4A10).

3.3.2.1 2.1755 MHz/455 kHz Converter (A4A1)

The 1st IF output from the RF Conversion Section drives the 50 ohm input of the 2.1755 MHz/455 kHz Converter (A4A1). The Converter also receives the 2nd LO signal from the Synthesizer (A3) Section which tunes from 1.721-1.720001 MHz. The 1st IF and 2nd LO are mixed to produce the 2nd IF, 455 kHz. The 2nd IF output of A4A1 is buffered and drives the parallel connected inputs of IF Filters (A4A2-A4A6).

3.3.2.2 IF Filters 1-5 (A4A2-A4A6) (Bandwidths Customer Selected)

The 2nd IF output from (A4A1) drives the paralleled high impedance inputs of IF Filters (A4A2-A4A6). The equivalent parallel impedance of the five filters presents a 200 ohm load to the output of (A4A1). The IF Filters are voltage selectable by the BW select data from the Digital Control Section. Each filter, when selected, operates at approximately unity gain. When not selected, each filter exhibits greater than 60 dB of isolation. The 455 kHz 2nd IF signal passes through the selected IF filter and is bandlimited to the bandwidth of the filter. The bandlimited 2nd IF output of (A4A2-A4A6) drives the high impedance input of the 455 kHz IF Amplifier (A4A7). For more detailed information refer to the WJ-9926A-XXXX IF Filter Set Instruction Manual.

3.3.2.3 455 kHz IF Amplifier (A4A7)

The bandlimited 2nd IF output from (A4A2-A4A6) drives the input of the 455 kHz IF Amplifier (A4A7). The signal is amplified by a two stage, gain controlled (for AGC purposes) amplifier with an overall bandwidth of 30 kHz. The amplified 2nd IF output from (A4A6) drives the input of Wideband/Narrowband Filter (A4A8).

3.3.2.4 Wideband/Narrowband Filter (A4A8)

The 2nd IF output from (A4A7) drives the input of Wideband/Narrowband Filter (A4A8). The signal is applied to both the wide and narrowband circuits of (A4A8). Circuit selection is accomplished by the Wideband/Narrowband Select data, derived from the BW Select data driving (A4A2-A4A6). If an IF BW of 2 kHz or less is selected, the 2nd IF signal passes through the narrowband circuit in (A4A8) which provides a 4 kHz bandwidth. If an IF BW greater than 2 kHz is selected, the 2nd IF signal passes through the wideband circuit in (A4A8) which provides a 28 kHz bandwidth. The amplified, bandlimited 2nd IF output from (A4A8) drives the input of the AM/FM/SSB Demodulator (A4A9).

FIGURE 3-3

WJ-8625-1 VLF RECEIVER

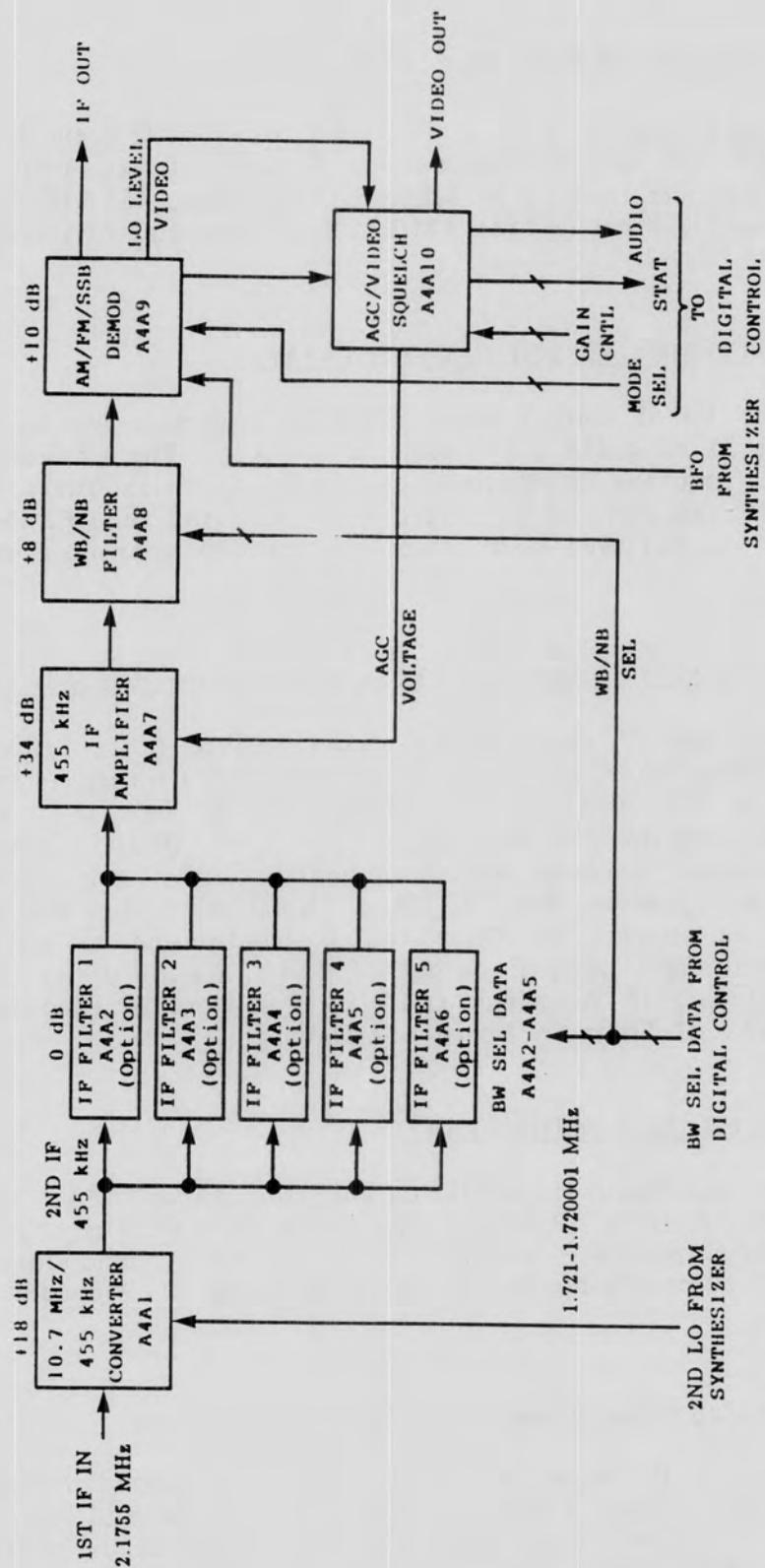


Figure 3-3. IF/Demodulator (A2) Block Diagram

3.3.2.5 AM/FM/SSB Demodulator (A4A9)

The 2nd IF output from (A4A8) drives the input of the AM/FM/SSB Demodulator (A4A9). The signal is amplified by a Broadband Buffer Amplifier to drive the rear panel IF output jack (A4J2). The amplified 2nd IF signal also drives the AM, FM and SSB Detector circuits. The detected AM, FM and SSB video is selected by the Mode Select Data from the Digital Control Section and is sent as Low Level Video to the AGC/Video/Squelch (A4A10). The AM Detector also provides a DC level to (A4A10) for AGC control.

3.3.2.6 AGC/Video/Squelch (A4A10)

Low Level Video from A4A9 drives the input of AGC/Video/Squelch (A4A10). The video signal is amplified by a Video Buffer amplifier and drives the rear panel video output jack (A4J3).

The DC gain control voltage from (A4A9) drives the AGC processing circuitry in (A4A10). This circuitry is controlled by the Mode Select data from the Digital Control. The output of the AGC processing circuitry is an AGC voltage to (A4A7), an RF AGC voltage to (A3) and Signal Strength Voltage to the Digital Control Section.

3.3.3 SYNTHESIZER SECTION

Figure 3-4 is a block diagram of the Synthesizer Section Motherboard (A5). As shown in Figure 3-4, the Synthesizer consists of four major modules: Reference Divider (A5A1); 1st LO Synthesizer (A5A2); 2nd LO Synthesizer (A5A3); BFO Synthesizer (A5A4).

3.3.3.1 Reference Divider (A5A1)

The Reference Divider (A5A1), is the heart of the Synthesizer (A3). A stable 50 MHz Reference input from rear panel jack (J2) is run through a series of digital dividers to generate the various time base signals required by the four synthesizers. The Reference Divider outputs are: 20 kHz (1st LO); 1 MHz, 8 kHz (2nd LO); 1 kHz (BFO).

3.3.3.2 1st LO Synthesizer (A5A2)

The 1st LO Synthesizer (A5A2) produces the 1st LO signal required by the Input Filter Converter (A3). A 20 kHz time base signal is supplied by the Reference Divider (A5A1) to lock the phase lock loop circuits of (A5A2). Tuning of the 1st LO is provided by the 1st LO tuning data from the Digital Control. This data consists of four BCD encoded data words representing the 1 MHz, 100 kHz, 10 kHz, and 1 kHz receiver tuned frequency digits. When the receiver is set to 00.00XXX MHz, the 1st LO output is 2.176 MHz. When the receiver is set to 1.5XXX MHz, the 1st LO output is 3.676 MHz.

FIGURE 3-4

WJ-8625-1 VLF RECEIVER

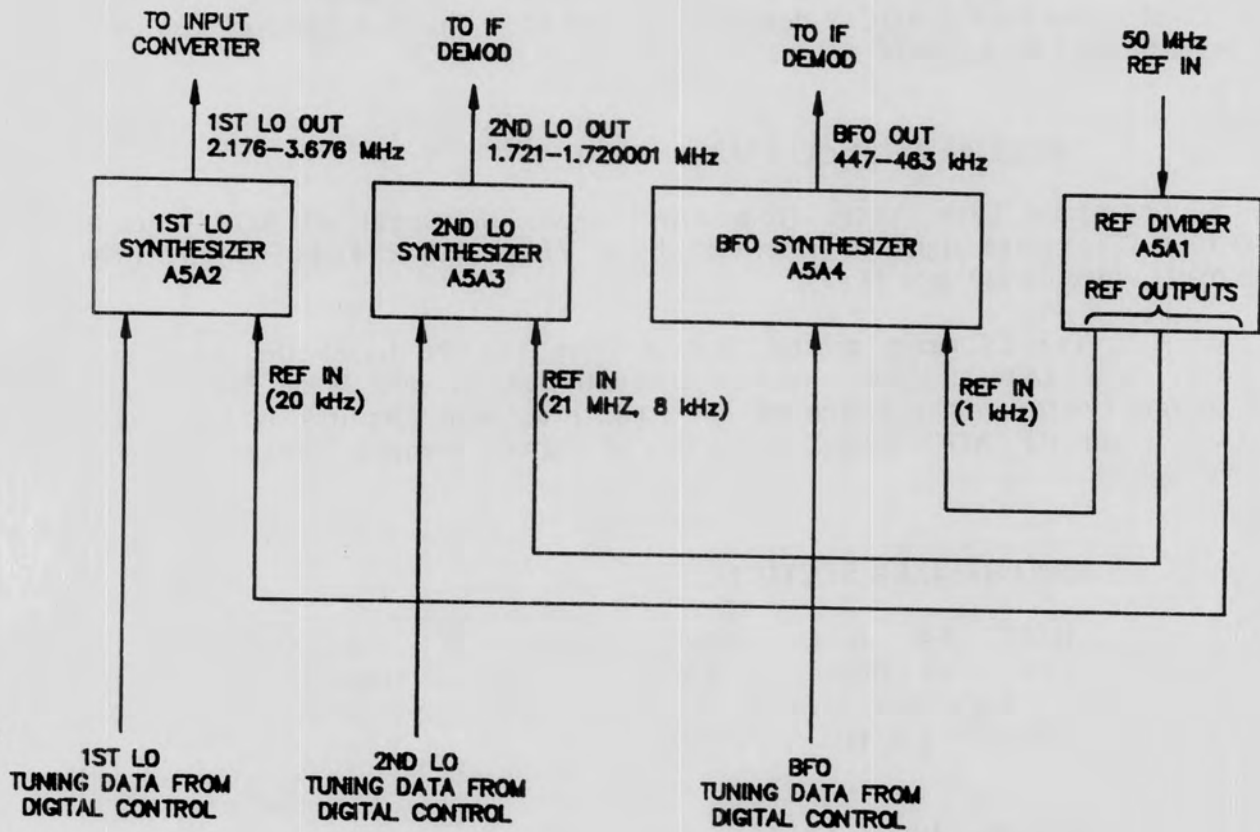


Figure 3-4. Synthesizer (A5) Block Diagram

3.3.3.3 2nd LO Synthesizer (A5A3)

The 2nd LO Synthesizer (A5A3) produces the 2nd LO signal required by the 2.1755 MHz/455 kHz Converter (A4A1). The 1 MHz and 8 kHz time base signals are supplied by the Reference Divider (A5A1) to lock the phase lock loop circuits of (A5A3). Tuning of the 2nd LO is provided by the 2nd LO tuning data from the Digital Control. This data consists of three BCD encoded data words representing the, 100 Hz, 10 Hz and 1 Hz receiver tuned frequency digits. When the receiver is set to XX.XX000 MHz, the 2nd LO output is 1.721000 MHz. When the receiver is set to XX.XX999 MHz, the 2nd LO output is 1.720001 MHz.

3.3.3.4 BFO Synthesizer (A5A4)

A 1 kHz time base signal is supplied by the Reference Divider (A5A1) to lock the BFO phase lock loop circuits. Tuning of the BFO is provided by the BFO tuning data from the Digital Control. This data consists of two BCD encoded data words representing BFO Offset Frequency in kHz. When an offset of -8.0 kHz is requested, the BFO output is 447.0 kHz. When an offset of 0.0 kHz is requested, the BFO output is 455.0 kHz. When an offset of +8.0 is requested, the BFO output is 463.0 kHz.

3.3.4 DIGITAL CONTROL SECTION

Figure 3-5 is a block diagram of the Digital Control Section. As shown in Figure 3-5, the Digital Control Section consists of the Digital Interface (A6).

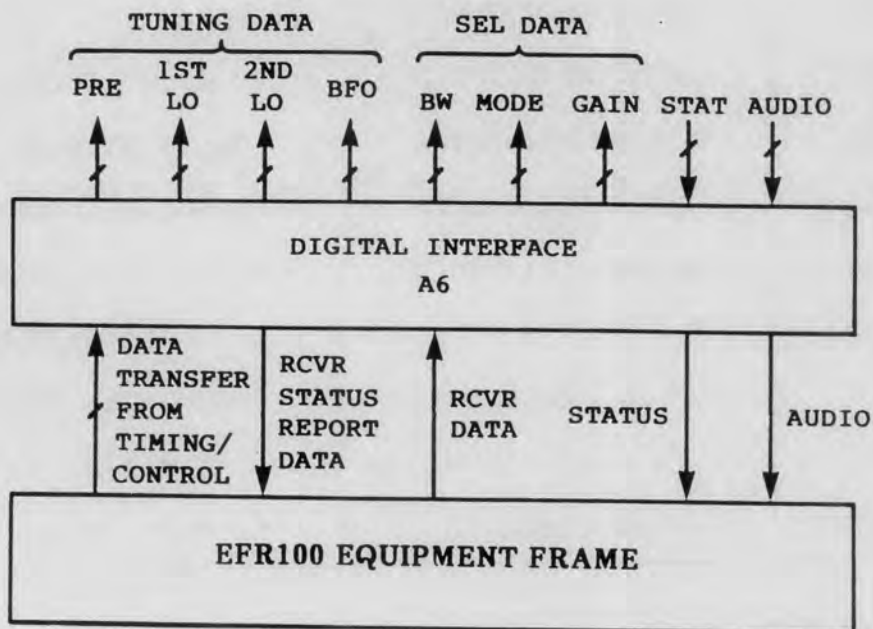


Figure 3-5. Digital Control Block Diagram

TABLE 3-2

WJ-8625-1 VLF RECEIVER

3.3.4.1 Digital Interface (A6)

The Digital Interface (A6) consists of a serial to parallel converter, a parallel to serial converter, status reporting logic and timing/control circuitry. It functions as the major interface point between the receiver analog section and the EFR100 backplane.

Receiver parameter data is transmitted as a 72-bit serial data stream. This 72-bit word completely defines all receiver operating parameters. Table 3-1 shows the configuration of this word. As shown, the 72-bit stream is organized into nine 8-bit words. The transfer of the serial data stream into the Digital Interface (A6) is coordinated by data transfer timing/control signals. These signals consist of four lines: data, clock, strobe and enable. All 72 bits of the data stream are run into a serial to parallel converter. When all 72 bits have been transferred, receiver analog section as tuning and select data. The EFR100 backplane communicates directly with the Digital Interface via two serial data streams: Receiver Data and Receiver Identification Report. On power up, and every ten seconds thereafter, the IOM108 requests and receives a 16-bit configurator, or module identifier, through the Receiver Report line. Each time a tuned parameter is changed, the Receiver Data line, in conjunction with the timing and control signals, shifts 72 bits of command/control data to the Receiver Interface. Refer to Table 3-1 for the binary format.

Table 3-1. 72-Bit Receiver Parameter Data Word

	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
BYTE 1: SIGN	(10 Hz BFO OPTION)			((SIGN) * * *)				
BYTE 2: OFFSET	(1 kHz BFO DIGIT)			(100 Hz BFO DIGIT)				
BYTE 3: FREQ 1	(10 Hz FREQ DIGIT)			(1 Hz FREQ DIGIT)				
BYTE 4: FREQ 2	(1 kHz FREQ DIGIT)			(100 Hz FREQ DIGIT)				
BYTE 5: FREQ 3	(100 kHz FREQ DIGIT)			(10 kHz FREQ DIGIT)				
BYTE 6: FREQ 4	*	*	*	*	*	*	(1 MHz FREQ)	
BYTE 7: COS	(AFC) (FAST)			(COS THRESHOLD LEVEL)				
BYTE 8: GAIN	(AGC)			(MANUAL GAIN CONTROL LEVEL)				
BYTE 9: BW/DET	(IF BW CODE)			* * (DET MODE CODE)				

*Indicates bits not used.

3.3.4.1 Digital Interface (A6) - (Continued)

Figure 3-6 shows the Digital Interface/EFR100 backplane connection. The CMD/CONT DATA IN line is a serial data line. The EFR100 backplane uses this line to transfer receiver parameter data and communication commands.

The REPORT DATA OUT LINE is used to report a unique serial data word called the configurator. This is a word generated by software that defines the receiver type, tuning range, bandwidth and options present.

The TIMING/CONTROL lines are generated by the external controller and are used to coordinate the transfer of CMD/CONT and REPORT DATA between the Receiver Interface and the External Controller.

3.3.5 POWER SUPPLY SECTION

Figure 3-7 is a block diagram of the Power Supply Section. As shown in Figure 3-7, the Power Supply Section consists of one module, Voltage Regulator (A1).

3.3.5.1 Voltage Regulator Motherboard (A1)

The Voltage Regulator Motherboard (A1) contains three fixed voltage regulator modules. The +18 V input to (A1) is dropped to a fixed regulated output of +15 V. The -18 V input to (A1) is dropped to a fixed regulated output of -15 V. The +18 V input to (A1) is dropped to a fixed regulated output of +5 V. These three DC voltages, along with the +29 V unregulated voltage from the external power supply, are distributed to the receiver circuits.

FIGURE 3-6
FIGURE 3-7

WJ-8625-1 VLF RECEIVER

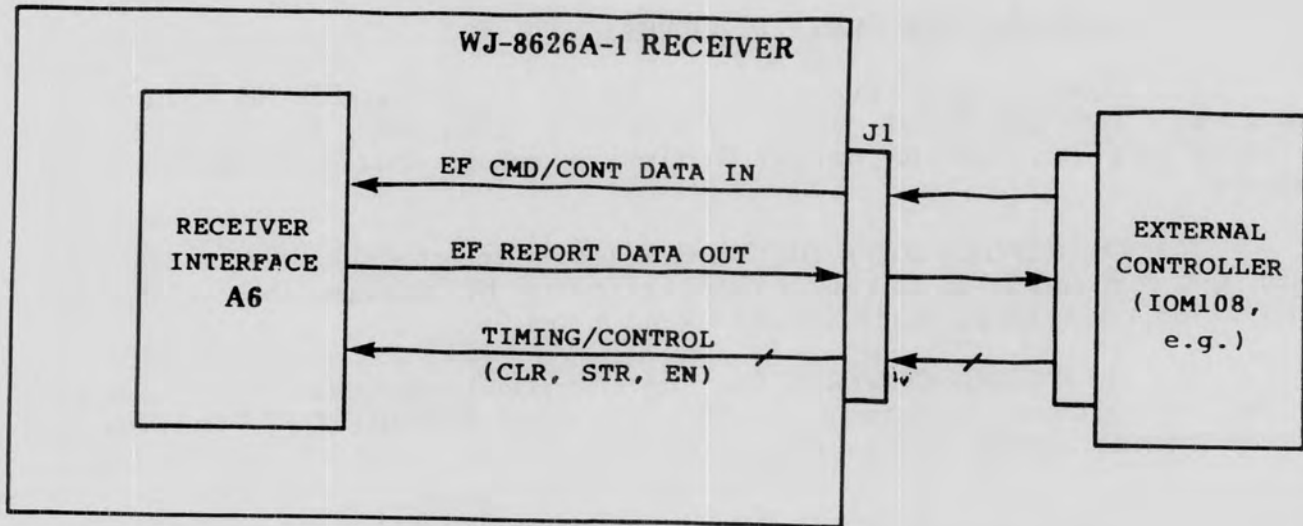


Figure 3-6. External Controller Interface

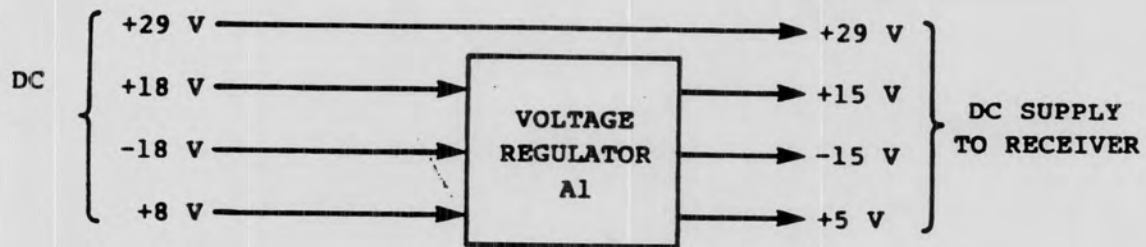


Figure 3-7. Power Supply Block Diagram

SECTION IV

MAINTENANCE

4.1 GENERAL

This section contains maintenance procedures for the WJ-8625-1 VLF Receiver. Preventive maintenance, performance verification tests, troubleshooting/fault isolation and alignment are included.

4.2 MODULE ACCESS

The receiver is a highly compact, and small printed circuit assemblies are used. Removal of the top cover permits access to the assemblies. **CAUTION:** When removing the receiver from the WJ-9040 Equipment Frame, make sure the two upper thumb screws, used to hold the receiver in place, are turned counter-clockwise until the end of the screw is at least FLUSH with the inside of the front panel. If this is not done, possible damage can result to components of the AGC/Video/Squelch (A4A10) board as it is removed from the Receiver housing.

4.3 PREVENTIVE MAINTENANCE

Preventive maintenance consists of visual inspection and cleaning. These procedures are described in this paragraph. Table 4-1 is a recommended schedule for performing preventive maintenance procedures.

Table 4-1. Preventive Maintenance Schedule

PROCEDURE	INTERVAL	COMMENTS
Cleaning	60 days	Interval variable depending on the operating environment.
Inspection for Damage	60 days	Interval variable depending on operating environment and equipment use.
Performance Tests	180 days	Interval variable depending on operating environment and equipment use.
Adjustment/Alignment	---	Adjustment/Alignment keyed to results of Performance Tests.

MAINTENANCE

WJ-8625-1 VLF RECEIVER

4.3.1 VISUAL INSPECTION

Many potential or existing faults can be detected by making a visual inspection of the unit. For this reason, a complete visual inspection should be made on a routine basis and whenever the receiver is inoperative. At a minimum, the following items should be visually inspected.

1. Inspect the equipment covers and front panel for condition of finish and panel markings.
2. Inspect for dents, punctures, or warped areas.
3. Inspect quarter-turn fasteners and receptacles.
4. Inspect the external surfaces for loose or missing screws or washers.
5. Inspect the receptacles for conditions of pins, contacts, and mountings.
6. Inspect the internal components for signs of deterioration, discoloration, or charring. Check for melted insulation and damaged, cracked, or broken components.
7. Inspect the printed circuit boards for damaged tracks, loose connections, corrosion, or other signs of deterioration.
8. Inspect the PC connectors, interface connectors, and chassis wiring for excessive wear, looseness, misalignment, corrosion, or other signs of deterioration.

4.3.2 CLEANING

Cleaning should be performed to remove accumulated dust, grease, and other contamination, and to ensure trouble-free operation.

CAUTION

Avoid the use of chemical cleaning agents containing benzene, toluene, xylene, acetone, or similar solvents. These chemicals may damage the plastics used in this receiver.

1. Exterior - Dust the cabinet with a soft cloth. Dust the front panel controls with a small soft-bristled paint brush. Dirt clinging to the cabinet may be removed with a clean, lint-free cloth dampened with a mild detergent and water solution. Avoid using abrasive cleaners. They will scratch the front panel.

4.3.2 **CLEANING - (Continued)**

2. Interior - Dust in the interior of the unit should be removed before it builds up enough to cause arcing and short circuits during periods of high humidity. Dust is best removed by dry, low-pressure air. Dirt clinging to surfaces may be removed with a soft-bristled paint brush or a clean, lint-free cloth dampened with a mild detergent and water solution. Use a cotton tipped applicator for cleaning in narrow spaces and on the circuit boards.

4.4 **RECEIVER PERFORMANCE TESTS**

4.4.1 **GENERAL**

The Performance Tests outlined in this paragraph define the Minimum Performance Standards which ensure adequate receiver functioning in all detection modes, gain modes and IF bandwidths. The tests should be used for initial receiver inspection, for preventive maintenance checks, for troubleshooting or to verify receiver performance after repairs have been made.

4.4.2 **MINIMUM PERFORMANCE STANDARDS**

Table 4-2 summarizes the parameters tested by the Performance Tests. To be acceptable for use, the receiver should meet or exceed all minimum performance standards listed.

Table 4-2. Receiver Minimum Performance Standards

PARAMETER TO BE TESTED	PERFORMANCE STANDARD
Command and Control (Via WJ-8625-1 Controller or Computer Terminal)	All functions operational
IF Gain, Input to IF Out	82 dB +/- 2 dB
Video Output in AM Mode	350 mV minimum into 75 ohms with -100 dBm input and 50% modulation at 400 Hz
Video Output in FM Mode	350 mV minimum into 75 ohms with -100 dBm input and 4.8 kHz deviation at 400 Hz
Video Output in CW Mode	350 mV minimum into 75 ohms with -100 dBm input unmodulated and receiver offset -400 Hz

TABLE 4-2
TABLE 4-3

WJ-8625-1 VLF RECEIVER

Table 4-2. Receiver Minimum Performance Standards - (Continued)

PARAMETER TO BE TESTED	PERFORMANCE STANDARD
AGC Range	Control range -100 dBm to -13 dBm with less than 6 dB output change
Manual Gain Control Range	Greater than 90 dB
Frequency Tuning Accuracy	Determined by the accuracy and stability of the 50 MHz Reference Input. The standard receiver is tunable in 1 Hz steps

4.4.3 TEST EQUIPMENT REQUIRED

Table 4-3 lists the test equipment required for performance testing of the receiver. Equivalent types of equipment may be used.

Table 4-3. Test Equipment Required

INSTRUMENT TYPE	REQUIRED CHARACTERISTICS	RECOMMENDED INSTRUMENT
Signal Generator	AM, FM, CW, RF output	HP-3325
Oscilloscope	DC to 50 MHz	HP-180C
RF Voltmeter	1 mV to 3.0 V; -50 dBm	Boonton 92B to +20 dBm
Digital Counter	0 to 500 MHz	HP-5303A
AC Voltmeter	1 mV to 300 V, full scale	HP-400E
DVM	DC ranges; 1% or better	Fluke 8100A
Terminator, 75 ohm	75 ohms, 1/2 watt	75 ohm 1/2 watt resistor soldered to BNC male connector
Headphones	Mono, 600 ohms impedance	Telex 820-4
Master Receiver/Controller		WJ-8625-4
Computer Terminal	I/O Option to match IOM108 DIO (if installed)	HP-85 or HP-200 series

4.4.4 **PROCEDURE GUIDELINES**

1. Read each test procedure thoroughly before attempting to perform the test.
2. Hook up the proper test equipment as indicated in the Test Setup figure for each test.
3. Set the test equipment and receiver controls as directed for each test. Control settings are made via the Master Receiver/Controller keypad/display or computer terminal.
4. Allow a minimum of 30 minutes warm-up time for test equipment prior to performing any of the tests.
5. Unless otherwise specified, acceptable tolerances are +/- 3 dB for signal levels and +/- 20% for AC and DC supply voltages.
6. The tests should be performed in the order given. If a malfunction is noted, refer to **paragraph 4.5** for troubleshooting information.

4.4.5 **IF GAIN TEST**

1. Connect the receiver as shown in **Figure 4-1**.
2. Energize the DC power source.
3. Using the controller front panel or computer terminal set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Bandwidth - 16 kHz (or widest IF BW installed)
 - c. Gain Mode - Manual
 - d. RF Gain - Maximum
 - e. Tuned Frequency - .75 MHz
4. Set the signal generator output frequency to .75 MHz unmodulated and output level to -100 dBm.
5. Set the RF voltmeter to the -10 dBm range. The meter should indicate -15 dBm +/- 2 dB.
6. Select all available bandwidths. The level for each bandwidth should be -15 dBm +/- 2 dB.

FIGURE 4-1

WJ-8625-1 VLF RECEIVER

4.4.5 IF GAIN TEST - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

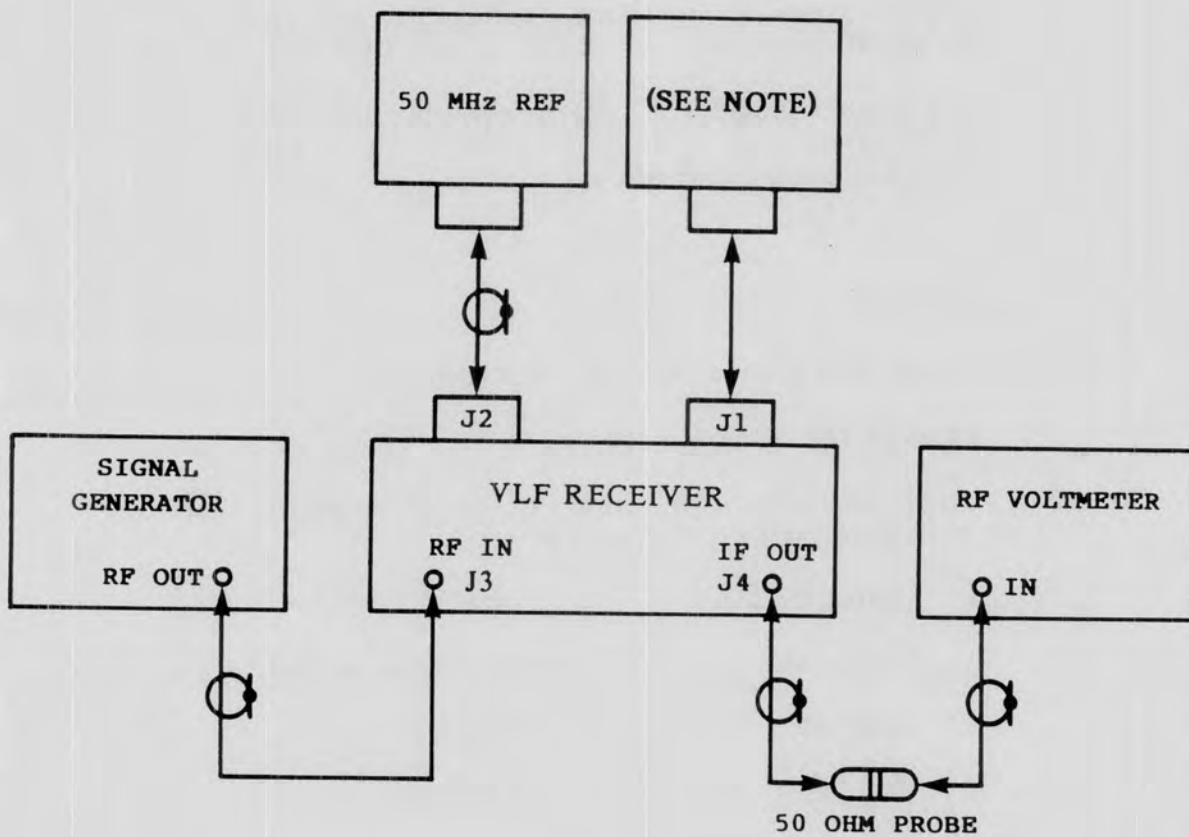


Figure 4-1. IF Gain Test Equipment Setup

4.4.5 IF GAIN TEST - (Continued)

7. Change the detection mode to USB. Change the generator frequency to 1 kHz above the tuned frequency. The RF voltmeter level should be -15 dBm +/- 2 dB for USB and LSB.
8. Change the detection mode to LSB. Change the generator frequency to 1 kHz below the tuned frequency. The RF Voltmeter level should be -15 dBm +/- 2 dB.
9. Return the receiver to the settings listed in step 3.
10. Tune the signal generator and the receiver to 10 kHz, 100 MHz, .150 MHz, .2 MHz, .3 MHz, .5 MHz, .7 MHz, 1.0 MHz and 1.5 MHz in succession. At each frequency the RF voltmeter should read within 3 dB of the level obtained in step 5 above.
11. Deenergize the DC power source.

4.4.6 DETECTION MODE TEST

1. Connect the receiver as shown in Figure 4-2.
2. Energize the DC power source.
3. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Bandwidth - 1 kHz (or nearest IF BW installed)
 - c. Gain Mode - Manual
 - d. RF Gain - Maximum
 - e. Tuned Frequency - .75 MHz
4. Set the signal generator output frequency to .75 MHz and output level to -100 dBm. Set the Generator for 50% AM modulation at 400 Hz.
5. Set the oscilloscope to the 0.5 V/CM range. The oscilloscope should display a 400 Hz sine wave at a level of 1 Vpp or greater.
6. Turn off the generator modulation.
7. Select the CW Mode. Enter a BFO offset of -0.4 kHz.
8. The oscilloscope should display a 400 Hz sine wave at a level of 1 Vpp or greater.

FIGURE 4-2

WJ-8625-1 VLF RECEIVER

4.4.6

DETECTION MODE TEST - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

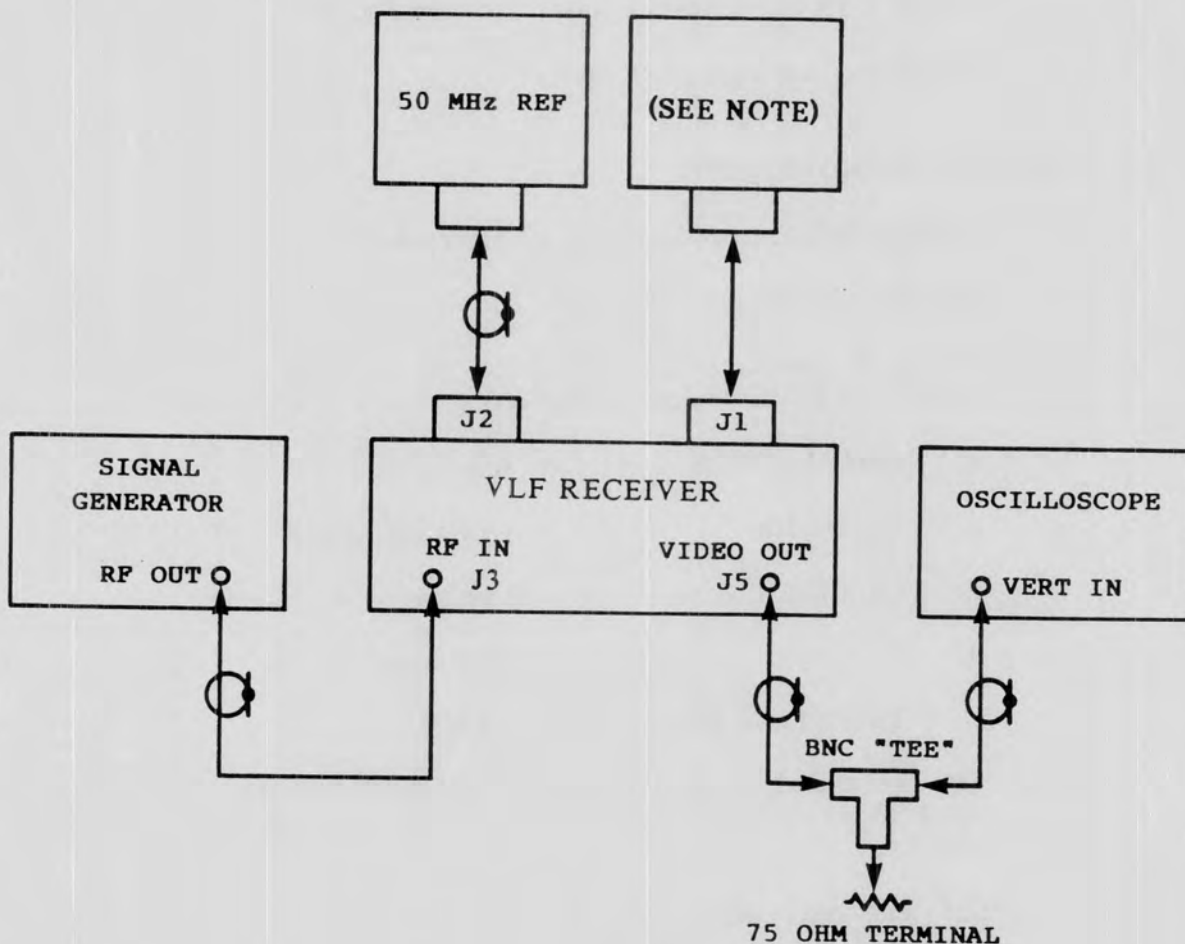


Figure 4-2. Detection Mode Test Equipment Setup

4.4.6 **DETECTION MODE TEST - (Continued)**

9. Set the generator for 4.8 kHz FM deviation at 400 Hz.
10. Select the FM Mode. Select the 16 kHz IF BW or the widest BW installed.
11. The oscilloscope should display a 400 Hz sine wave at a level of 1 V_{pp} or greater.
12. Deenergize the DC power source.

4.4.7 **SIGNAL-TO-NOISE RATION (SNR) TEST**

1. Connect the receiver as shown in **Figure 4-3**.
2. Energize the DC power source.
3. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - CW
 - b. Bandwidth - 16 kHz (or widest installed)
 - c. Gain Mode - Manual
 - d. RF Gain - Maximum
 - e. Tuned Frequency - .75 MHz
 - f. BFO Offset - -0.4 kHz
4. Set the signal generator output frequency to .75 MHz unmodulated and output level to -100 dBm.
5. Set the AC voltmeter range for a convenient indication and record the level displayed.
6. Turn the generator RF output off.
7. The AC voltmeter reading should decrease by at least 16 dB.
8. Deenergize the DC power source.

4.4.8 **GAIN CONTROL TEST**

1. Connect the receiver as shown in **Figure 4-4**.
2. Energize the DC power source.

FIGURE 4-3

WJ-8625-1 VLF RECEIVER

4.4.8 GAIN CONTROL TEST - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

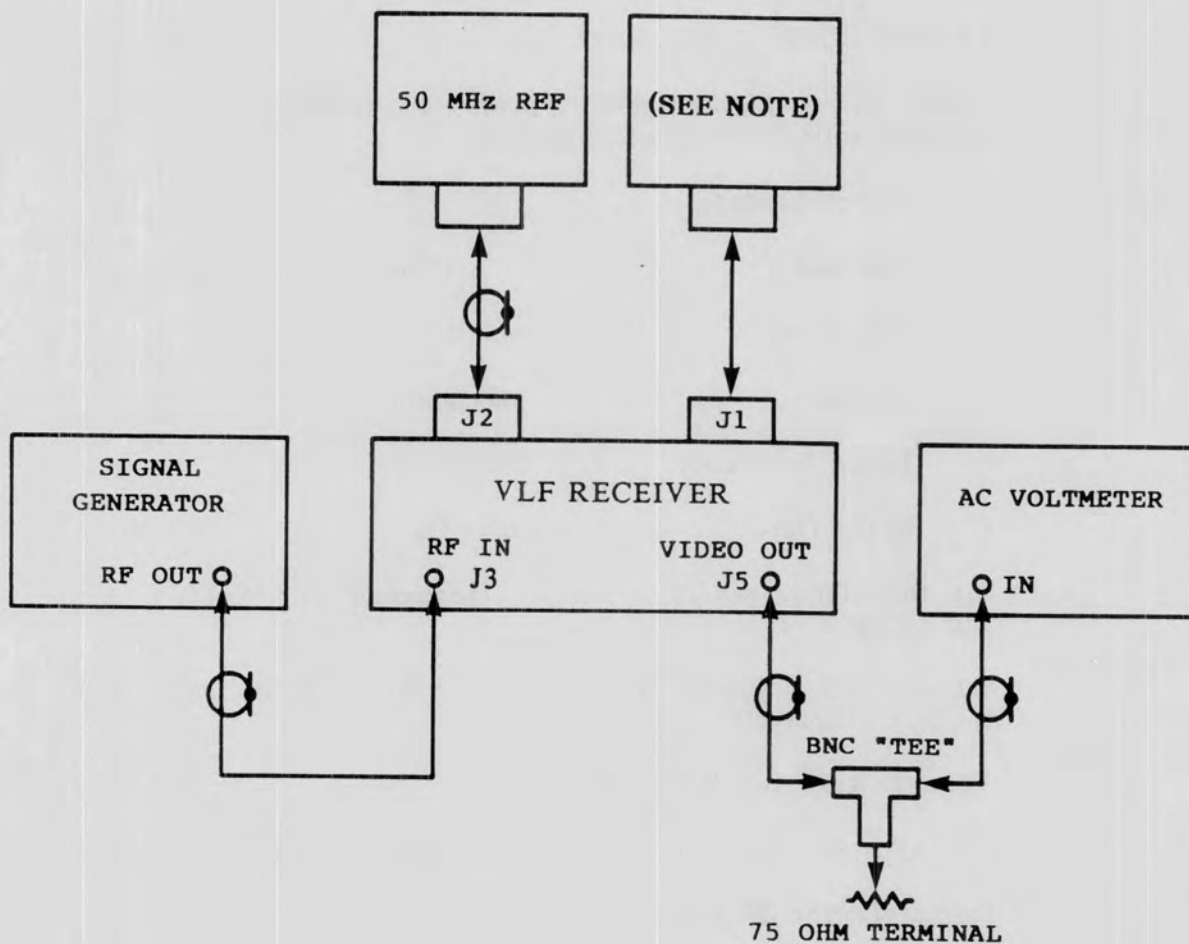


Figure 4-3. SNR Test Equipment Setup

4.4.8 GAIN CONTROL TEST - (Continued)

3. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Bandwidth - 1 kHz (or nearest installed)
 - c. Gain Mode - Manual
 - d. RF Gain - Maximum
 - e. Tuned Frequency - .75 MHz
4. Set the AC voltmeter range for a convenient indication and record the level displayed.
5. Increase the signal generator output level in 10 dBm increments until +3 dBm is reached. For each 10 dBm increase, increase the RF Gain control until the AC voltmeter indicates the level recorded in step 4 above.
6. Decrease the signal generator output level to -103 dBm.
7. Select the AGC FAST gain mode. Record the level displayed on the AC voltmeter.
8. Increase the signal generator output level to -13 dBm. The AC voltmeter reading should increase no more than 6 dB above the level recorded in step 7.
9. Deenergize the DC power source.

4.4.9 FREQUENCY TUNING ACCURACY TEST

1. Connect the receiver as shown in Figure 4-5.
2. Energize the DC power source.
3. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Bandwidth - 1 kHz (or nearest installed)
 - c. Gain Mode - AGC FAST
 - d. Tune Frequency - .75 MHz

FIGURE 4-4

WJ-8625-1 VLF RECEIVER

4.4.9

FREQUENCY TUNING ACCURACY TEST - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

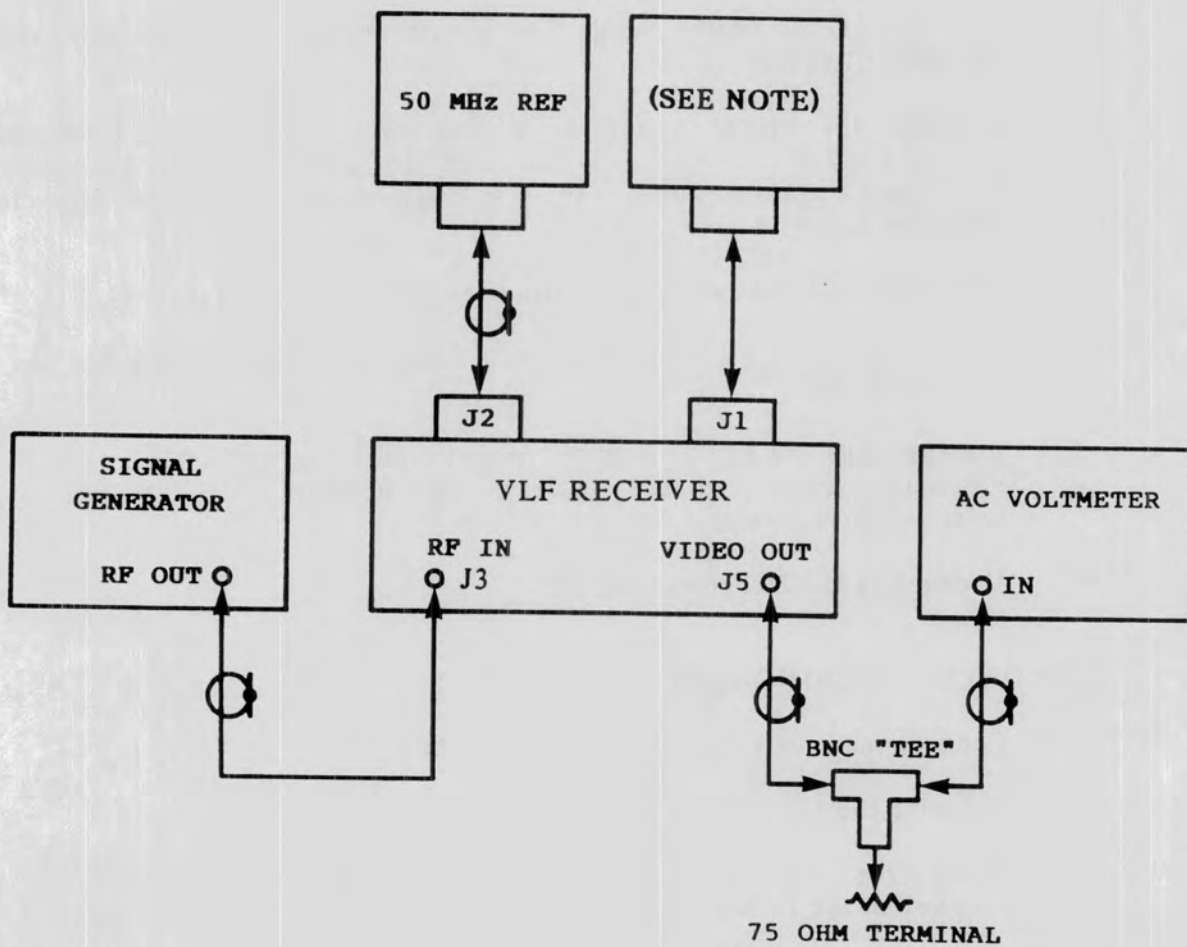


Figure 4-4. Gain Control Test Equipment Setup

4.4.9 FREQUENCY TUNING ACCURACY TEST - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

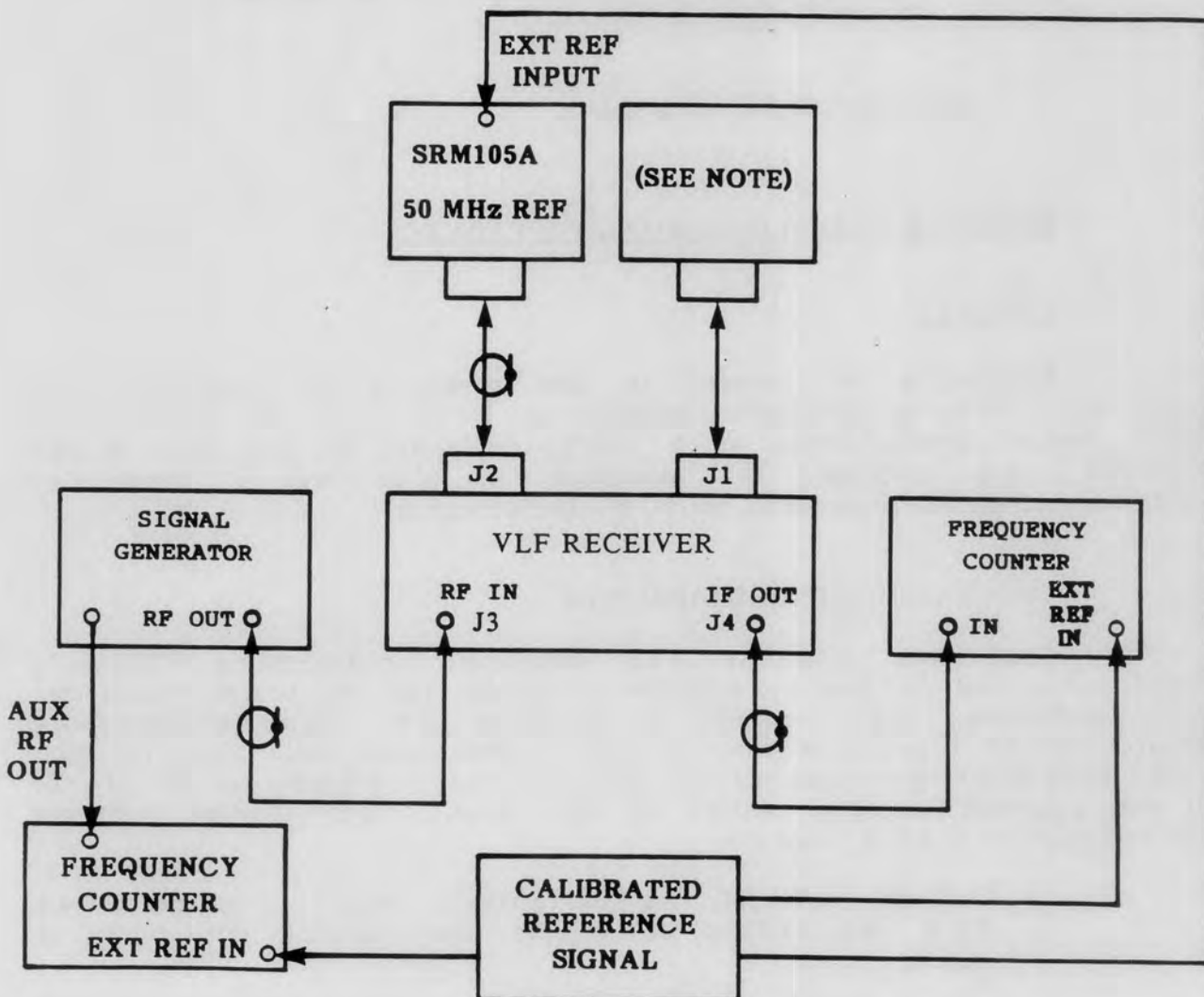


Figure 4-5. Frequency Tuning Accuracy Test Equipment Setup

4.4.9 **FREQUENCY TUNING ACCURACY TEST - (Continued)**

4. Set the signal generator output frequency to .75 MHz unmodulated and output level to -60 dBm.
5. Set the frequency counter to provide 10 Hz resolution at a 1 second sample rate.
6. The frequency counter should indicate 455.00 kHz +/- 0.1 kHz.

NOTE

Receiver tuning accuracy is based upon the accuracy and stability of the 50 MHz reference input. Refer to the specification for the oscillator being used. The FRM150 or internally locked SRM105A is 1 part in 10^6 .

7. Deenergize the DC power source.

4.5 **RECEIVER TROUBLESHOOTING PROCEDURES**

4.5.1 **GENERAL**

Information is provided in this paragraph to troubleshoot the receiver to a defective replaceable assembly or PC board. The receiver will normally require troubleshooting as a result of failure to pass any of the performance tests outlined in paragraph 4.4, or as a result of operator-observed malfunctions during normal receiver operation.

4.5.2 **TROUBLESHOOTING GUIDELINES**

Table 4-4, WJ-8625-1 VLF Receiver Troubleshooting Chart, is provided as an aid in locating defective assemblies and PC boards within the receiver performance tests outlined in paragraph 4.4. The troubleshooting procedures provide a listing of specific fault symptoms that could occur for each of the performance tests outlined in paragraph 4.4. Probable causes of the fault and suggested corrective actions are also listed. The following guidelines should be applied when using Table 4-4.

1. Perform each of the performance tests in paragraph 4.4. Note any failures to achieve the expected test result or results.
2. Refer to Table 4-4. Locate the performance test and fault symptom noted in step 1.

4.5.2 TROUBLESHOOTING GUIDELINES - (Continued)

3. Perform the corrective action associated with the fault symptom. If a module is replaced requiring alignment, refer to paragraph 4.6 and perform the indicated alignment.
4. Repeat the performance test in paragraph 4.4 that resulted in the fault symptom to confirm the corrective action.
5. The receiver may be returned to service if it successfully passes all the performance tests in paragraph 4.4.
6. Table 4-4 is intended as a general troubleshooting guide and is not a substitute for standard signal tracing/fault isolation techniques performed by skilled technicians familiar with the receiver circuitry.

Table 4-4. WJ-8625-1 VLF Receiver Troubleshooting Chart

Performance Test	Fault Symptom	Probable Cause	Corrective Action
IF GAIN TEST	IF output dead on all BWs	Defective AGC	Replace A4A10
	IF output dead on 1 or more BWs	Defective Input	Check A3 for 15 dB gain. If bad, replace A3.
Defective IF modules		LO signals defective	Check LO signals: 1st: 2.926 MHz at 0 dBm at A3J2. 2nd: 1.721 MHz at 0 dBm at A4E2. If any LO is bad, first replace affected LO module. If still bad, replace A6, then A9A5.
		Defective IF filter module(s)	Check or replace A4A1, A4A7 (A4A8 (A4A9).
			Check BW select, pin 11, on affected module (A4A2-A4A6). Should be +15V when selected. If OK, replace module associated with defective BW. If bad, replace A6, then A9A5.

TABLE 4-4

WJ-8625-1 VLF RECEIVER

4.5.2 TROUBLESHOOTING GUIDELINES - (Continued)

Table 4-4. WJ-8625-1 VLF Receiver Troubleshooting Chart - (Cont'd)

Performance Test	Fault Symptom	Probable Cause	Corrective Action
IF GAIN TEST (Cont'd)		Defective WB/NB filter module	Check select inputs, pins 5 and 7, on A4A8. Should be +15V when selected. If OK, replace A4A8. If bad, replace A6, then A9A5.
COMMAND/ CONTROL TEST	Receiver not identified by controller or does not respond to new status commands	Digital Control Section defective. (Test bed assumed to be operational, if not refer to WJ-9040 System Common Equipment Instruction Manual for performance verification.	Replace A6.
DETECTION MODE TEST	No video output in any mode	Defective video output amplifier	Replace A4A10, then A4A9.
	No AM video	Defective AM det	Check AM select at A4A9-B2 for +15V. If OK, replace A4A9. If bad, replace A6, then A9A5.
	No FM video	Defective FM detector	Check FM select at A4A9-A1 for +15V. If OK, replace A4A9. If bad, replace A6, then A9A5.
	No CW video	Defective CW detector	Check CW select at A4A9-A7 for +15V. If bad, replace A6, then A9A5. If OK, check BFO signal at A4A9-A12. Should be 455.000 kHz at 40 mV. If bad, replace A5A4, then A6, then A9A5. If BFO signal is OK, then replace A4A9.
	No SSB video		Replace A6, then A9A5.

4.5.2 TROUBLESHOOTING GUIDELINES - (Continued)

Table 4-4. WJ-8625-1 VLF Receiver Troubleshooting Chart - (Cont'd)

Performance Test	Fault Symptom	Probable Cause	Corrective Action
SNR TEST	Signal-to-noise ratio is less than 16 dB	Low receiver gain	Perform IF Gain Alignment, paragraph 4.6.3.
		Low 1st LO signal	Check 1st LO signal at A3J2. Should be 0 dBm. If bad, replace A5A2.
		Low input converter gain	Check RF AGC voltage at chassis terminal E4 for 0 Vdc. If OK, replace A3. If bad, replace A4A10. Perform Input Converter Alignment, paragraph 4.6.2.
GAIN CONTROL TEST	Output level variation is more than 6 dB in FST	Defective AGC amplifier	Check IF AGC voltage at A4A10-A2. Should be greater than -4 Vdc at max. signal. If bad, replace A4A10. If OK, replace A4A7.
		Defective AGC amplifier	Check MAN GAIN IN at A4A10-A4. Should be +0.45 V with RF GAIN at max CW. If OK, replace A4A10. If bad, replace A6, then A9A5, then A9A6.
FREQUENCY TUNING ACCURACY TEST	Tuning error than +/- 100 Hz at 29.99990 MHz	Time Base	Verify accuracy of 50 MHz Reference.
		1st or 2nd LO tuning error	Replace A5A2 and A5A3. If still bad, replace A6, then A9A5.

4.6 RECEIVER ALIGNMENT PROCEDURES

4.6.1 GENERAL

The following alignment procedures should only be performed when indicated by the results of Performance Testing (paragraph 4.4) or Troubleshooting (paragraph 4.5). Prior to performing any alignment, be sure to allow 30 minutes for test equipment warm-up.

4.6.2 INPUT FILTER CONVERTER ALIGNMENT

1. Connect the receiver as shown in Figure 4-6.
2. Loosen the screws holding the Input Filter Converter module to the chassis. Pull the module out.
3. Energize the DC power source.
4. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Bandwidth - 16 kHz (or widest installed)
 - c. Gain Mode - Manual
 - d. RF Gain - Maximum
 - e. Tuned Frequency - .75 MHz
5. Set the network analyzer to measure return loss S11 across 200 Hz to 1.5 MHz.
6. Adjust (A3A1L1-A3A1L5) such that the return loss is greater than 10 dB across the 200 Hz - 1.5 MHz frequency range.

LO NULL ADJUST: (Turn unit on with cover for 1 hour minimum)

7. Next, replace the network analyzer with a signal generator.
8. Set the signal generator output to 1.0 MHz and output level of -90 dBm.
9. Set the receiver to 1 MHz, MAN MAX GAIN, BW #1. Adjust (A3A2L2) for maximum SM output.

4.6.2 INPUT CONVERTER ALIGNMENT - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

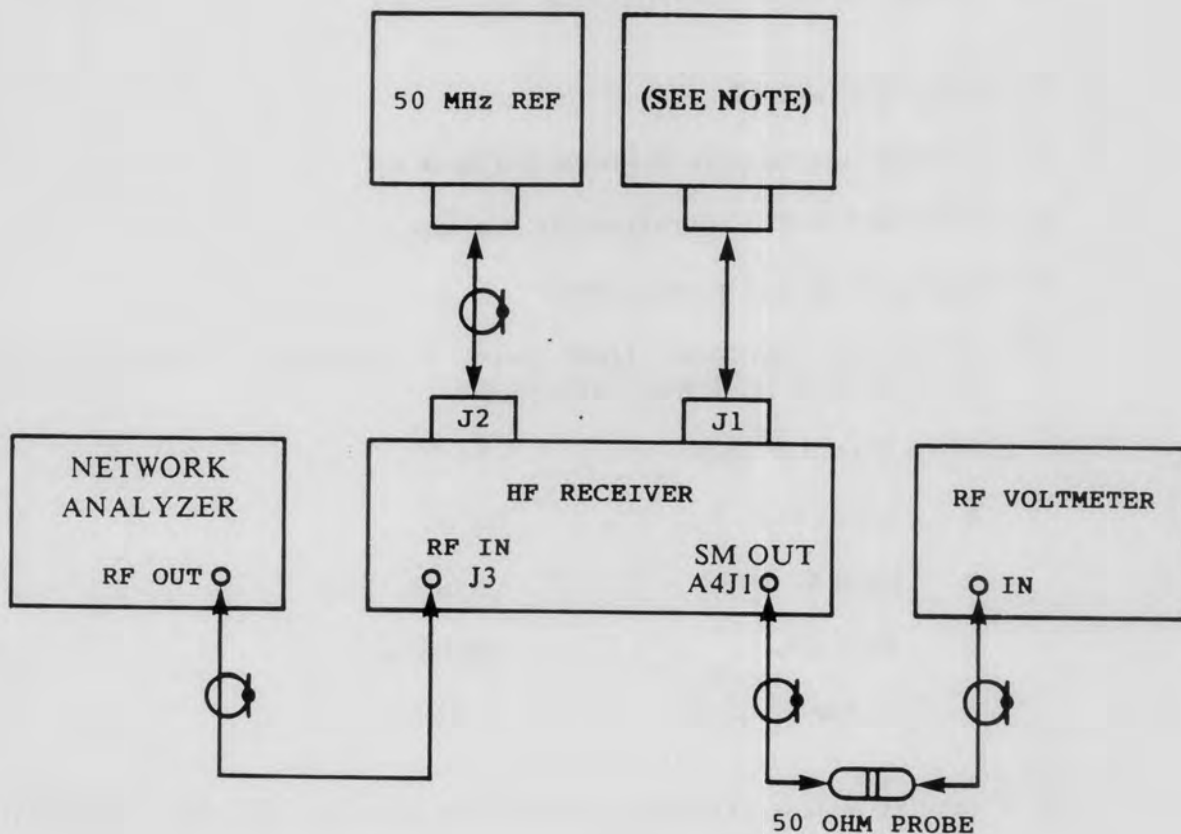


Figure 4-6. Input Filter Converter Adjustment Equipment Setup

4.6.2 INPUT FILTER CONVERTER ALIGNMENT - (Continued)

LO NULL ADJUST: - cont'd

10. Record the SM output level measured at the RF voltmeter.
11. Tune the receiver to 0.0 MHz.
12. Adjust A3A1R7 to minimize the level at the SM output.
13. Adjust A3A1R13 and C21 to further minimize the SM output level.
14. Verify that the LO leakage to the SM output is lower than that recorded in step 10.
15. Deenergize the DC power source.
16. Install the input converter into that chassis.

4.6.3 IF GAIN ALIGNMENT

1. Connect the receiver as shown in Figure 4-7.
2. Set A4A7-R16 at approximately mid-range.
3. Energize the DC power source.
4. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Bandwidth - BW #1
 - c. Gain Mode - Manual
 - d. RF Gain - Maximum
 - e. Tuned Frequency - .75 MHz
5. Set the signal generator output frequency to .75 MHz unmodulated and output level to -100 dBm.
6. Set the RF voltmeter to the -10 dBm range.
7. Adjust A4A2-R12 for a voltmeter reading of -15 dBm.
8. Using the IF BW keypad, step the receiver to IF BW #2. Adjust A4A3-R12 for a voltmeter reading of -15 dBm.

4.6.3 IF GAIN ALIGNMENT - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

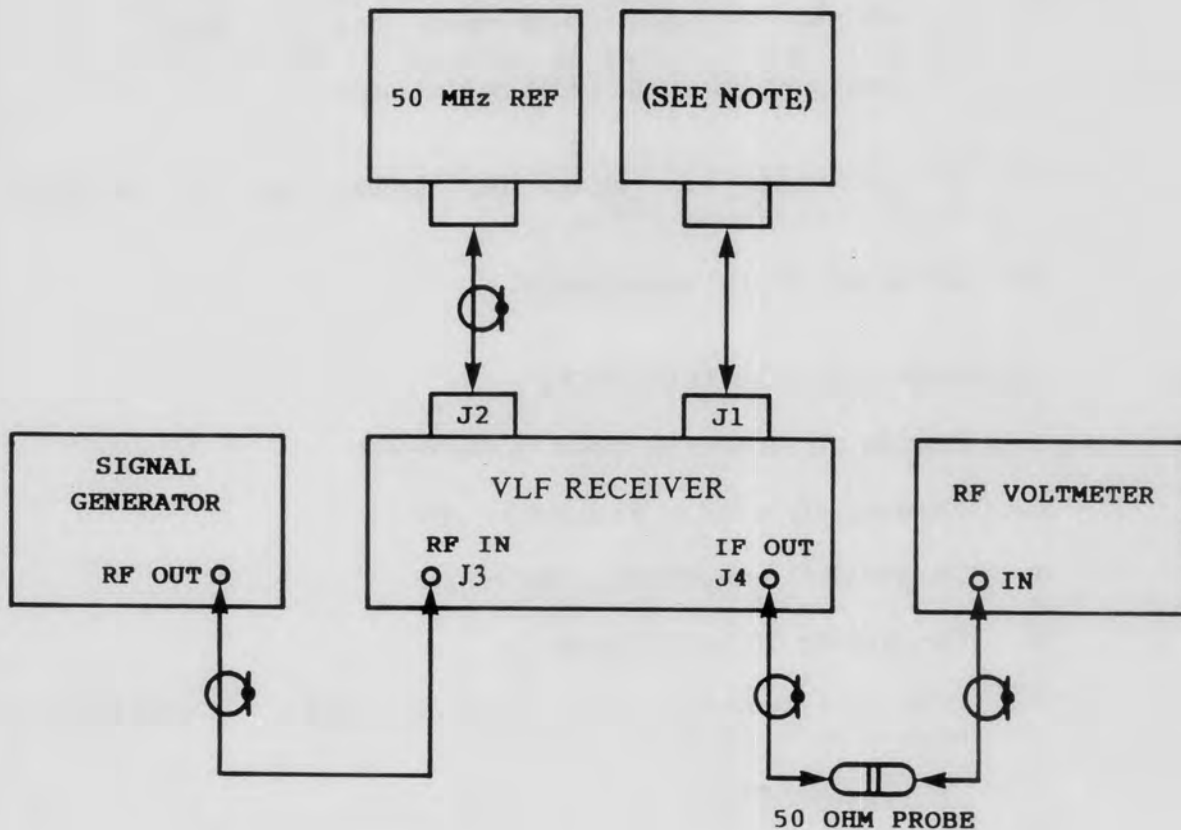


Figure 4-7. IF Gain Adjustment Equipment Setup

MAINTENANCE

WJ-8625-1 VLF RECEIVER

4.6.3 IF GAIN ALIGNMENT - (Continued)

9. Using the IF BW keypad, step the receiver to IF BW #3. Adjust A4A4-R12 for a voltmeter reading of -15 dBm.
10. Using the IF BW keypad, step the receiver to IF BW #4. Adjust A4A5-R12 for a voltmeter reading of -15 dBm.
11. Using the IF BW keypad, step the receiver to IF BW #5. Adjust A4A6-R12 for a voltmeter reading of -15 dBm.
12. If the correct output reading is not achieved using A4A2-A4A6. Adjust A4A7-R16 as required and repeat steps 7 through 11.

NOTE

If discreet Sideband Filters are installed in slots 4 and 5, the USB and LSB Modes must be selected to adjust their gain, and the generator frequency must be increased +1 kHz in USB mode and decreased -1 kHz in LSB mode.

13. If adjustments were made, step through each IF BW again to verify correct output levels.
14. Deenergize the DC power source.

4.6.4 FM DISCRIMINATOR ALIGNMENT

1. Connect the receiver as shown in **Figure 4-8**.
2. Place module A4A9 on an extender card
3. Set A4A9R51 approximately mid-range.
4. Energize the DC power source.
5. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - FM
 - b. Bandwidth - 3 kHz (or nearest installed)
 - c. Gain Mode - AGC FAST
 - d. Tuned Frequency - .75 MHz
6. Set the signal generator output frequency to .75 MHz unmodulated and output level to -60 dBm.

4.6.3 IF GAIN ALIGNMENT - (Continued)

NOTE

I/O connector J1 is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

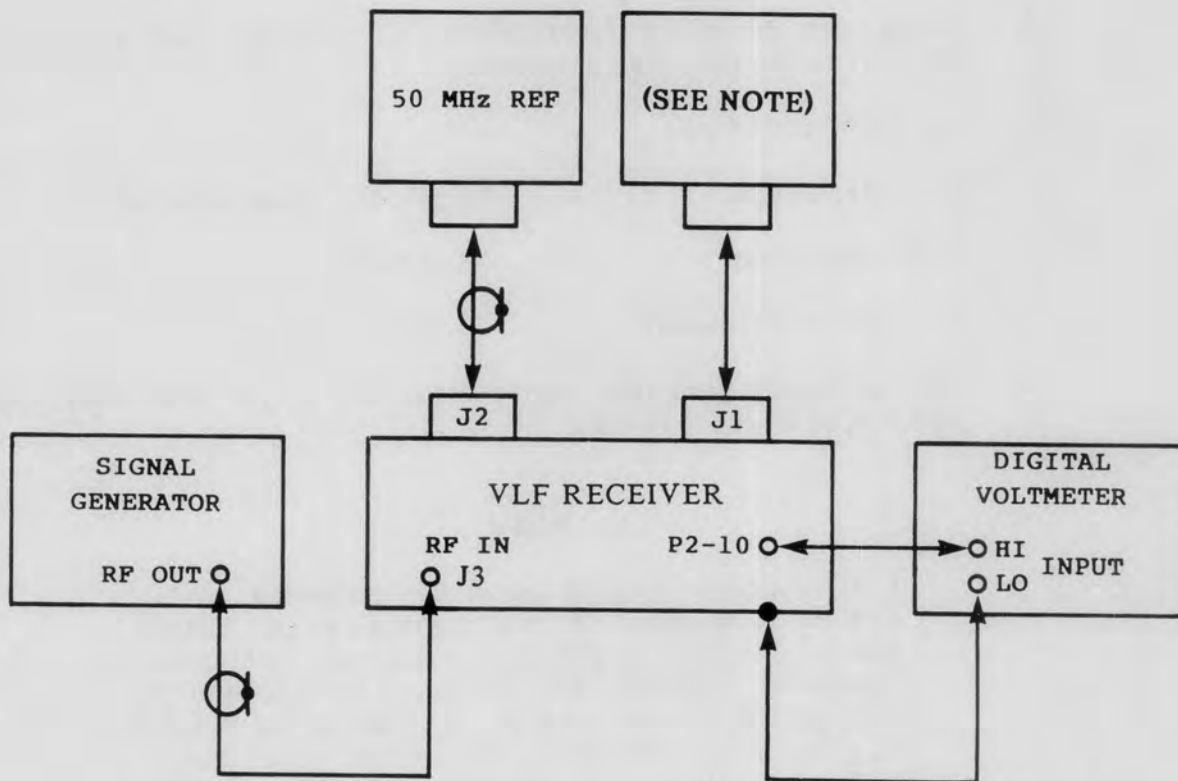


Figure 4-8. FM Discriminator Adjustment Equipment Setup

GENERAL DESCRIPTION

WJ-8625-1 VLF RECEIVER

4.6.4 FM DISCRIMINATOR ALIGNMENT - (Continued)

7. Set the digital voltmeter to the 2 Vdc range.
8. Adjust A4A9L4 for approximately 0 Vdc on the voltmeter.
9. Use A4A9R51 to fine adjust the discriminator output to 0 +/- 0.05 Vdc on the voltmeter.
10. Deenergize the DC power source.

4.6.5 SIGNAL STRENGTH FULL SCALE OUTPUT ALIGNMENT

1. Connect receiver as shown in Figure 4-9.
2. Energize the DC power source.
3. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Bandwidth - 16 kHz (or widest installed)
 - c. Gain Mode - AGC FAST
 - d. Tuned Frequency - .75 MHz
4. Set the signal generator output frequency to .75 MHz unmodulated and output level to -10 dBm.

NOTE

I/O connector (J1) is normally connected to an EFR100 Equipment Frame containing an EPS100 Power Supply, a FRM150 Frequency Reference Module or SRM105A Site Reference Module, and an IOM108 I/O Control Module. Command and control signals are provided by either a Master Receiver/Controller or computer terminal via the IOM108.

WJ-8625-1 VLF RECEIVER

FIGURE 4-9

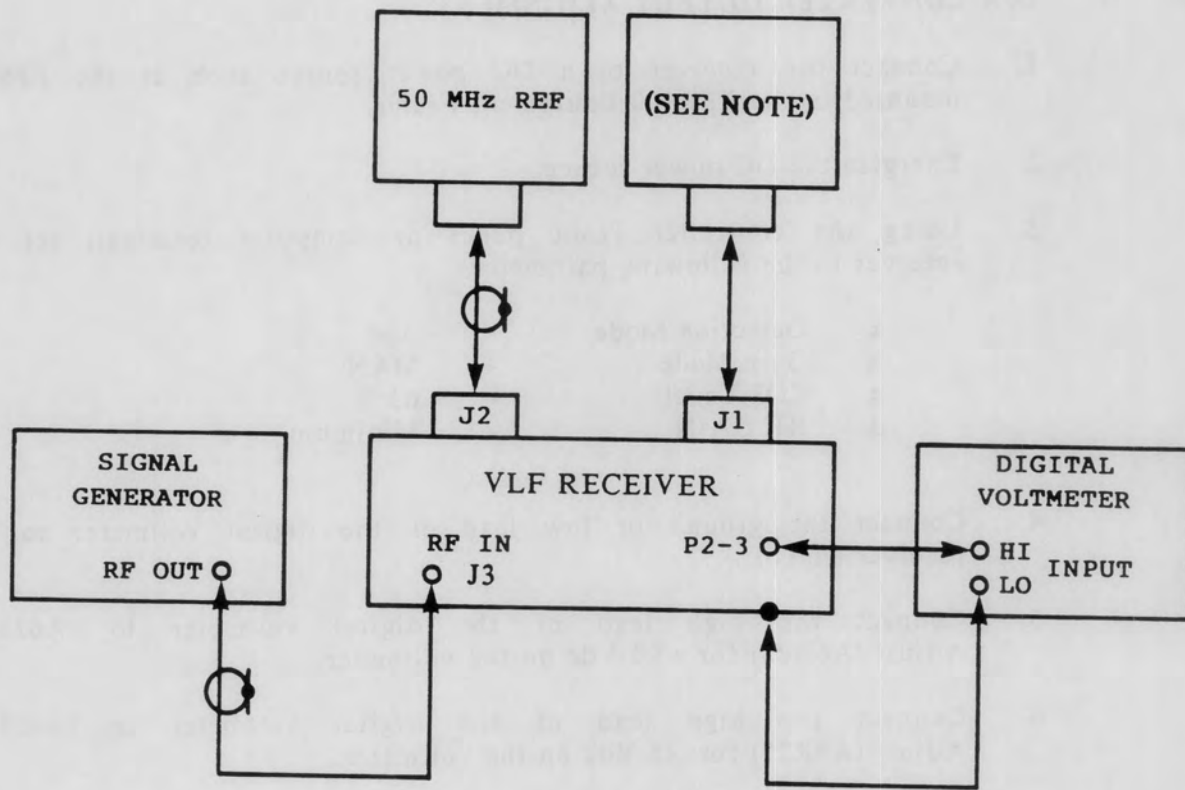


Figure 4-9. Signal Strength Full Scale Output Adjustment Equipment Setup

4.6.5 **SIGNAL STRENGTH FULL SCALE OUTPUT ALIGNMENT - (Continued)**

5. Set the digital voltmeter to the 20 Vdc scale.
6. Adjust (A4A10R34) for 9.5 Vdc on the voltmeter.
7. Deenergize the DC power source.

4.6.6 **D/A CONVERTER OUTPUT ALIGNMENT**

1. Connect the receiver to a DC power source such as the EPS100 mounted in the EFR100 Equipment Frame.
2. Energize the DC power source.
3. Using the controller front panel or computer terminal, set the receiver to the following parameters:
 - a. Detection Mode - AM
 - b. Gain Mode - MAN
 - c. COS Level - 63
 - d. RF GAIN - Minimum
4. Connect the ground or low lead of the digital voltmeter to the receiver chassis.
5. Connect the high lead of the digital voltmeter to (A6J3-9). Adjust (A6R28) for +5.0 Vdc on the voltmeter.
6. Connect the high lead of the digital voltmeter to (A6J3-9). Adjust (A6R25) for .45 Vdc on the voltmeter.
7. Deenergize the DC power source.

4.6.7 **1ST LO SYNTHESIZER ALIGNMENT**

The only alignment points for the 1st LO are in the 1st LO VCO which is a very sensitive circuit; care must be taken to ensure proper operation.

1. Place the 1st LO on an extender card.
2. Remove the VCO front plate.
3. Connect a digital voltmeter to pin (A5A2A2C1).
4. Refer to Table 4-5. Beginning at Band 0, adjust the indicated components until the voltage at pin (A1E1) stays within limits as the receiver is tuner through Band 0.

4.6.7 1ST LO SYNTHESIZER ALIGNMENT - (Continued)

5. Repeat for Bands 2 through 7. As indicated in Table 4-5, the inductors align more than one band and a compromise between bands may be necessary.
6. Deenergize the DC power source.
7. Disconnect the digital voltmeter. Replace the VCO front plate and place the 1st LO back in the receiver.

Table 4-5. VCO Alignment Procedures

VCO Band	Band Freq. Limits	Voltage at Pin A2C1 (Typical)	A2A1 Alignment Component
0	0 - .199 MHz	8.0 to - 5.0 Vdc	C3
1	.2 - .399 MHz	8.0 to - 5.0 Vdc	L2
2	.4 - .599 MHz	8.0 to - 5.0 Vdc	L3
3	.6 - .799 MHz	8.0 to - 5.0 Vdc	L2 & L3
4	.8 - .999 MHz	8.0 to - 5.0 Vdc	L4
5	1.0 - 1.199 MHz	8.0 to - 5.0 Vdc	L2 & L4
6	1.2 - 1.399 MHz	8.0 to - 5.0 Vdc	L3 & L4
7	1.4 - 1.5 MHz	8.0 to - 5.0 Vdc	L2, L3 & L4

4.6.8 2ND LO SYNTHESIZER ALIGNMENT

The 2nd LO Synthesizer Alignment consists of a 17 MHz Loop Alignment, a Programmable Loop Alignment and an Output Loop Alignment. Perform the procedure in the given sequence.

1. Preliminary Setup
 - a. Mount the 2nd LO Synthesizer on an extender board.
 - b. Energize the DC power source and allow 30 minutes for warm-up.
2. 17 MHz Loop Alignment
 - a. Connect a digital voltmeter to Test Point (E1).
 - b. Adjust (C19) until a voltmeter reading of 7.5 Vdc is observed with the alignment tool withdrawn from the VCO shield.
3. Programmable Loop Alignment
 - a. Connect a digital voltmeter to Test Point (E2).
 - b. Tune the controller to 1.000999 MHz.
 - c. Adjust (C61) until a voltmeter reading of -8.0 Vdc is observed with the alignment tool withdrawn from the VCO shield.

4.6.8 **2ND LO SYNTHESIZER ALIGNMENT - (Continued)**

4. Output Loop Alignment
 - a. Connect a digital voltmeter to Test Point E3.
 - b. Tune controller to 1.000499 MHz.
 - c. Adjust C44 until a voltmeter reading of 7 Vdc is observed with the alignment tool withdrawn from the VCO shield.
 - d. Using a frequency counter, verify that a frequency of 1.720501 MHz +/- Hz is present at J1.
 - e. Ground TPE3 momentarily and verify that loop remains locked.

4.6.9 **BFO SYNTHESIZER ALIGNMENT**

1. Mount the 3rd LO/BFO Synthesizer on an extender board.
2. Connect a digital voltmeter to Test Point E2.
3. Using the front panel keypad or computer terminal, select CW mode and enter a BFO offset of 0 kHz.
4. Adjust C8 for a voltmeter reading of 6 +/- 1 Vdc.

SECTION V

REPLACEMENT PARTS LIST

5.1 UNIT NUMBERING METHOD

The unit numbering method of assigning reference designations (electrical symbol numbers) has been used to identify assemblies, subassemblies (and modules) and parts. An example of the unit numbering method follows:

<u>Subassembly Designation A1</u>	<u>R1 Class and No. of Item</u>
Identify from right to left as:	First (1) resistor (R) of first (1) subassembly (A)

As shown on the main chassis schematic, components that are an integral part of the main chassis have no subassembly designations.

5.2 REFERENCE DESIGNATION PREFIX

Partial reference designations have been used on the equipment and on the illustrations in this manual. The partial reference designations consist of the class letter(s) and identifying item number. The complete reference designations may be obtained by placing the proper prefix before the partial reference designations. Reference Designation Prefixes are provided on drawings and illustrations in parentheses within the figure titles.

5.3 LIST OF MANUFACTURERS

<u>Mfr. Code</u>	<u>Name and Address</u>	<u>Mfr. Code</u>	<u>Name and Address</u>
00779	AMP, Incorporated P. O. Box 3608 Harrisburg, PA 17105	04013	Taurus Corporation 1 Academy Hill Lambertville, NJ 08530
01295	Texas Instruments, Inc. Semiconductor-Components Div. 15300 North Central Expressway Dallas, TX 75231	04213	Caddell-Burns Mfg. Co., Inc. 40 East 2nd Street Mineola, NY 11501
02735	RCA Corporation Solid State Division Route 202 Somerville, NJ 08876	04713	Motorola, Inc. Semiconductor Products Div. 5005 East McDowell Road Phoenix, AZ 85008

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

<u>Mfr. Code</u>	<u>Name and Address</u>	<u>Mfr. Code</u>	<u>Name and Address</u>
06090	Raychem Corporation 300 Constitution Drive Menlo Park, CA 94025-1111	18324	Signetics Corporation 811 East Arques Avenue Sunnyvale, CA 94086
07263	Fairchild Camera & Instr. Corp. Semiconductor Division 464 Ellis Street Mountain View, CA 94040	19505	Applied Eng. Products, Co. Division of Samariou, Inc. 300 Seymour Avenue Derby, CT 06418
07766	TTE, Inc. 2214 Barry Avenue Los Angeles, CA 90064-1402	22526	Du Pont El De Nemours and Co. Inc., Photo Products Dept. Berg Electronics Div., Rt. 83 New Cumberland, PA 17070
09021	Airco, Inc. Airco Electronics Bradford, PA 17055	24355	Analog Devices, Inc. Route 1 Industrial Park P.O. Box 280 Norwood, MA 02062
13103	Thermalloy Co., Inc. 2021 W. Valley View Lane P. O. Box 810839 Dallas, TX 75381	27014	National Semi-Conductor Corp. 2950 San Ysidro Way Santa Clara, CA 95051
14632	Watkins-Johnson Company 700 Quince Orchard Road Gaithersburg, MD 20878	27735	F-Dyne Electronics 449 Howard Avenue Bridgeport, CT 06605-1831
14949	Trompeter Electronics, Inc. 31186 La Baya Drive P. O. Box 5069 Westlake Village, CA 91362-5069	27956	Relcom 3333 Hillview Avenue Palo Alto, CA 94304
15542	Mini-Circuits Laboratories Division of Scientific Components Corp. 2625 E. 14th Street Brooklyn, NY 11235	28480	Hewlett-Packard Company Corporate Headquarters 1501 Page Mill Road Palo Alto, CA 94304
15912	Thomas & Betts Corp. Electronics Group 4371 Valley Blvd. Los Angeles, CA 90032-3632	33095	Spectrum Control, Inc. 152 East Main Street Fairview, PA 16415
17856	Siliconix, Inc. 2201 Laurelwood Road Santa Clara, CA 95050	34371	Harris Corp. Harris Semiconductor Prod. Grp. 200 Palm Bay Blvd. Melbourne, FL 32919

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

<u>Mfr. Code</u>	<u>Name and Address</u>	<u>Mfr. Code</u>	<u>Name and Address</u>
49956	Raytheon Co. 141 Spring Street Lexington, MA 02173-7801	56637	RCD Components Inc. Manchester, NH
50157	Midwest Components, Inc. 1981 Port City Blvd. P. O. Box 787 Muskegon, MI 49443	59660	Tusonix Incorporated 2155 North Forbes Blvd. Tuscon, AZ 85745
51406	Morata Erie North America, Inc. 1148 Franklin Road, SE Marietta, GA 30067	70903	Cooper Belden Electronic Wire & Cable 2000 South Batavia Avenue Geneva, IL 60134-3325
51628	Tec Inc. 2727 N. Fairview Avenue Tucson, AZ 85705-4009	71279	Cambridge Thermionic Corp. 445 Concord Avenue Cambridge, MA 02138
51642	Centre Engineering, Inc. 2820 E. College Avenue State College, PA 16801-7515	71468	ITT Canon Electric Div. of ITT Corp. 10550 Talbert Ave. P. O. Box 8040 Fountain Valley, CA 92708
52648	Plessey Trading Corp. Plessey Optoelectronics and Microwave 1641 Kaiser Avenue Irvine, CA 92714	72136	Electro Motive Mfg. Co., Inc. South Park & John Streets Willimantic, CT 06226
52673	KSW Electronics Corp. Burlington, MA 01803	73138	Beckman Instruments, Inc. Helipot Division 2500 Harbor Blvd. Fullerton, CA 92634
54473	Matsushita Electric Corp. One Panasonic Way P. O. Box 1501 Secaucus, NJ 07094	79963	Zierick Mfg. Co. Radio Circle Mt. Kisco, NY 10549
55322	Samtec Incorporated 810 Progress Blvd. P. O. Box 1147 New Albany, IN 47150	80131	Electronic Industries Assoc. 2001 Eye Street, N.W. Washington, DC 20006
56289	Sprague Electric Company Marshall Street North Adams, MA 01247	80294	Bourns Instruments, Inc. 6135 Magnolia Avenue Riverside, CA 92506

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

<u>Mfr. Code</u>	<u>Name and Address</u>	<u>Mfr. Code</u>	<u>Name and Address</u>
81312	Winchester Electronics Div. of Litton Systems, Inc. 400 Park Road Watertown, CT 06795-1612	91984	Maida Development Co. 20 S. Libby P. O. Box 3529 Hampton, VA 23663-3679
81349	Military Specifications	95121	Quality Components, Inc. P.O. Box 113 St. Mary's, PA 15857
81350	Joint Army-Navy Specifications	99800	American Precision Industries Delevan Electronics Division 270 Quaker Road East Aurora, NY 14052
91293	Johanson Manufacturing Co. P. O. Box 329 Boonton, NJ 07005		

5.4 PARTS LIST

The parts list which follows contains all electrical parts used in the equipment and certain mechanical parts which are subject to unusual wear or damage. When ordering replacement parts from Watkins-Johnson Company, specify the type and serial number of the equipment and the reference designation and description of each part ordered. The list of manufacturers provided in **paragraph 5.3** and the manufacturer's part number for components are included as a guide to the user of the equipment in the field. These parts may not necessarily agree with the parts installed in the equipment; however, the parts specified in this list will provide satisfactory operation of the equipment. Replacement parts may be obtained from any manufacturer as long as the physical and electrical parameters of the part selected agree with the original indicated part. In the case of components defined by a military or industrial specification, a vendor which can provide the necessary component is suggested as a convenience to the user.

NOTE

As improved semi-conductors become available, it is the policy of the Watkins-Johnson Company to incorporate them in proprietary products. For this reason, some transistors, diodes, and integrated circuits installed in the equipment may not agree with those specified in the parts list and schematic diagrams of this manual. However, the semi-conductors designated in the manual may be substituted, in every case, with satisfactory results.

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5 TYPE WJ-8625-1 VLF RECEIVER, MAIN CHASSIS

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Voltage Regulator, Motherboard	1	271153-1	14632	
A2	Input Converter Power Supply PW Assembly	1	794613-1	14632	
A3	Input Filter Converter Assembly	1	794614-1	14632	
A4	IF Demodulator Motherboard	1	794598-1	14632	
A5	Synthesizer Motherboard PW Assembly	1	794414-2	14632	
A6	Digital Interface PW Assembly	1	794600-1	14632	
A7	LED Flexible Board	1	271134-1	14632	
C1	Capacitor, Ceramic, Feedthru: 0.05 μ F, GMV, 300 V	4	54-785-005-503P	33095	
C2 Thru C4	Same as C1				
E1	Terminal, Lug	1	505-169	79963	
E2	Terminal, Lug	1	505-120	79963	
J1	Connector, Receptacle	1	DBR-25P	71468	
J2	Connector, Jack, SMA	1	9230-7553-005	19505	
J3	Connector, Receptacle	1	225398-8	00779	
J4	Not Used				
J5	Not Used				
J6	Connector, Receptacle, Multipin	1	SRE9SJ	81312	
J7	Not Used				
P1	Plug Assembly	1	271794-2	14632	
P2	Not Used				
P3	Connector, Receptacle, Plug, Multipin	1	JF3S1PACD	81312	
P4	Connector, Plug	1	66900-020	22526	
P5	Connector, Plug	1	66900-014	22526	
P6	Connector, Plug	1	2105-7521-005	19505	
W1	Cable Assembly	1	271176-2	14632	
W2	Cable Assembly	1	17300-412-1	14632	
W2P1	Connector, Plug: SMB	1	2002-1551-005	19505	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.1 TYPE 271153-1 VOLTAGE REGULATOR MOTHERBOARD

REF DESIG PREFIX A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Voltage Regulator	1	764009-1	14632	
E1	Terminal, Forked	7	140-1941-02-01	71279	
E2 Thru E7	Same as E1				
J1	Terminal, Strip	1	65500-112	22526	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.1.1 Type 764009-1 Voltage Regulator

REF DESIG PREFIX A1A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 1 μ F, 20%, 35 V	6	196D105X0035HE3	56289	
C2 Thru C6	Same as C1				
P1	Connector, Plug	1	65001-010	22526	
RA1	Heat Sink	1	6073B	13103	
U1	Voltage Regulator	1	UA7805UC	07263	
U2	Voltage Regulator	1	MC7815CT	04713	
U3	Voltage Regulator	1	UA7915UC	07263	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.2 TYPE 794613-1 INPUT CONVERTER POWER SUPPLY

REF DESIG PREFIX A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Aluminum: 04.7 μ F, 20%, 35 V	3	ECE-A1VK4R7	54473	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: 100 pF, 5%, 100 V	1	8121-100-COGO-101J	59660	
C4	Capacitor, Ceramic, Disc: 1000 pF, 5%, 100 V	1	8121-100-COGO-102J	59660	
C5	Capacitor, Ceramic, Disc: 0.47 μ F, 20%, 50 V	2	34452-1	14632	
C6	Same as C1				
C7	Capacitor, Ceramic, Disc: 1 μ F, 20%, 50 V	1	8131-050-651-105M	59660	
C8	Same as C5				
C9	Capacitor, Electrolytic, Aluminum: 100 μ F, +50%-10%, 25 V	3	ECE-A1EV101S	54473	
C10	Same as C9				
C11	Same as C9				
C12	Capacitor, Ceramic, Monolithic: 470 pF, 5%, 100 V	1	8121-100-COGO-471J	59660	
J1	Terminal, Strip	1	65500-104	22526	
J2	Terminal, Strip	1	65500-106	22526	
R1	Resistor, Fixed, Film: 12.7 k Ω , 1%, 1/10 W	1	RN55C1272F	81349	
R2	Resistor, Fixed, Film: 5.6 Ω , 5%, 1/4 W	1	CF1/4-5.6 OHMS/J	09021	
R3	Resistor, Fixed, Film: 13.3 k Ω , 1%, 1/10 W	1	RN55C1332F	81349	
R4	Resistor, Fixed, Film: 12.1 k Ω , 1%, 1/10 W	1	RN55C1212F	81349	
R5	Resistor, Fixed, Film: 243 Ω , 1%, 1/10 W	1	RN55C2430F	81349	
R6	Resistor, Fixed, Film: 1.1 k Ω , 1%, 1/10 W	1	RN55C1101F	81349	
U1	Integrated Circuit	1	723DC	07263	
U2	Voltage Regulator	1	MC7915CT	04713	
U3	Voltage Regulator	1	LM317T	27014	
U4	Integrated Circuit	1	MC7812ACT	04713	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.3 TYPE 794614-1 INPUT FILTER CONVERTER

REF DESIG PREFIX A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Input Converter	1	371717-1	14632	
A2	1st IF/AGC	1	371718-1	14632	
C1	Capacitor, Ceramic, Feedthru: 0.05 μ F, GMV, 300 V	7	54-785-002-503P	33095	
C2 Thru C7	Same as C1				
E1	Terminal, Feedthru, Insulated	2	SFU16Y	04013	
E2	Same as E1				
FB1	Ferrite Bead	8	56-590-65-4A	02114	
FB2 Thru FB8	Same as FB1				
J1	Connector, Receptacle: SMB	3	2012-7511-000	19505	
J2	Same as J1				
J3	Same as J1				
P1	Plug Assembly	1	271794-1	14632	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.3.1 Part 371717-1 Input Converter

REF DESIG PREFIX A3A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Monolithic: 100 pF, $\pm 2\%$, 100 V	2	200-100-NPO-101G	51642	
C2	Capacitor, Ceramic, Monolithic: 2400 pF, $\pm 2\%$, 100 V	1	200-100-NPO-242G	51642	
C3	Capacitor, Ceramic, Monolithic: 4300 pF, $\pm 2\%$, 100 V	2	300-100-NPO-432G	51642	
C4	Capacitor, Ceramic, Monolithic: 4700 pF, $\pm 2\%$, 100 V	2	300-100-NPO-472G	51642	
C5	Same as C4				
C6	Same as C3				
C7	Capacitor, Ceramic, Monolithic: 2700 pF, $\pm 2\%$, 100 V	1	200-100-NPO-272G	51642	
C8	Capacitor, Ceramic, Disc: 1 μ F, 20%, 50 V	3	8131-050-651-105M	59660	
C9	Same as C8				
C10	Capacitor, Ceramic, Monolithic: 470 pF, 5%, 100 V	2	8121-100-COGO-471J	59660	
C11	Same as C10				
C12	Capacitor, Electrolytic, Aluminum: 470 μ F, +50%-10%, 25 V	4	ECE-A1EV471S	54473	
C13 Thru C15	Same as C12				
C16	Capacitor, Ceramic, Disc: 0.47 μ F, 20%, 50 V	4	34452-1	14632	
C17	Same as C8				
C18	Same as C16				
C19	Same as C16				
C20	Same as C1				
C21	Capacitor, Variable, Ceramic: 5-25 pF, 100 V	1	518-000A5-25	59660	
C22	Capacitor, Ceramic, Monolithic: 2200 pF, $\pm 2\%$, 100 V	1	200-100-NPO-222G	51642	
C23	Same as C16				
C24	Capacitor, Electrolytic, Aluminum: 33 μ F, 10%, 25 V	2	ECE-A1EK330	54473	
C25	Same as C24				
CR1	Diode	2	1N4449	80131	
CR2	Same as CR1				
E1	Terminal, Forked	9	140-1941-02-01	71279	
E2 Thru E9	Same as E1				
L1	Coil, Variable	2	31662-20	14632	
L2	Coil, Variable	3	31662-21	14632	
L3	Same as L2				
L4	Same as L2				
L5	Same as L1				
L6	Coil, Fixed, Molded: 27 μ H	1	1025-54	99800	
L7	Coil, Fixed, Molded: 5.6 μ H	1	1025-38	99800	
RA1	Heatsink	1	6012B	13103	
R1	Resistor, Fixed, Film: 620 Ω , 5%, 1/8 W	1	CF1/8-620 OHMS/J	09021	
R2	Resistor, Fixed, Film: 4.3 k Ω , 5%, 1/8 W	1	CF1/8-4.3K/J	09021	
R3	Resistor, Fixed, Film: 120 Ω , 5%, 1/8 W	3	CF1/8-120 OHMS/J	09021	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A3A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R4	Same as R3				
R5	Resistor, Fixed, Film: 200Ω, 5%, 1/8 W	1	CF1/8-200 OHMS/J	09021	
R6	Resistor, Fixed, Film: 56Ω, 5%, 1/8 W	1	CF1/8-56 OHMS/J	09021	
R7	Resistor, Variable, Film: 1 MΩ, 10%, 1/4 W	1	3262W-1-105	80294	
R8	Same as R3				
R9	Resistor, Fixed, Film: 2 kΩ, 5%, 1/8 W	1	CF1/8-2K/J	09021	
R10	Resistor, Fixed, Film: 510Ω, 5%, 1/8 W	1	CF1/8-510 OHMS/J	09021	
R11	Resistor, Fixed, Film: 750Ω, 5%, 1/8 W	1	CF1/8-750 OHMS/J	09021	
R12	Resistor, Fixed, Film: 51Ω, 5%, 1/8 W	1	CF1/8-51 OHMS/J	09021	
R13	Resistor, Variable, Film: 500Ω	1	3262W1-501	80294	
R14	Resistor, Fixed, Film: 240Ω, 5%, 1/4 W	1	CF1/4-240 OHMS/J	09021	
T1	Transformer	1	Z1007	07766	
T2	Transformer	1	Z1010	07766	
T3	Transformer, RF	1	T13-1T	15542	
U1	Integrated Circuit	1	HA3-5147A-5	34371	
U2	Integrated Circuit	1	SL6440C/DP	52648	
VR1	Diode, Zener: 6.2 V	2	1N753A	80131	
VR2	Same as VR1				

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.3.2 Part 371718-1 1st IF/AGC

REF DESIG PREFIX A3A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 330 pF, 10%, 100 V	1	8121-100-COGO-331K	59660	
C2	Capacitor, Ceramic, Disc: 100 pF, 5%, 100 V	1	8121-100-COGO-101J	59660	
C3	Capacitor, Ceramic, Disc: .47 μ F, 20%, 50 V	4	34452-1	14632	
C4 Thru C6	Same as C3				
C7	Capacitor, Electrolytic, Aluminum: 220 μ F, +50%-10%, 25 V	1	ECE-A1EV221S	54473	
C8	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	1	34475-1	14632	
C9	Capacitor, Ceramic, Disc: 6800 pF, 5%, 100 V	1	8131-100-COGO-682J	59660	
CR1	Diode	1	1N462A	80131	
E1	Terminal, Forked	4	140-1941-02-01	71279	
E2 Thru E4	Same as E1				
FL1	Crystal Filter: 2.1755 MHz	1	92483	14632	
L1	Coil, Fixed, Molded: 180 μ H	1	1025-74	99800	
L2	Coil, Variable: 1.5 μ H	1	6740-15	04213	
Q1	Transistor	1	MRF966	80131	
R1	Resistor, Fixed, Film: 1.0 k Ω , 5%, 1/4 W	1	CF1/4-1K/J	09021	
R2	Resistor, Fixed, Film: 10 Ω , 5%, 1/4 W	2	CF1/4-10 OHMS/J	09021	
R3	Resistor, Fixed, Film: 18 Ω , 5%, 1/4 W	1	CF1/4-18 OHMS/J	09021	
R4	Resistor, Fixed, Film: 4.3 k Ω , 5%, 1/4 W	1	CF1/4-4.3K/J	09021	
R5	Resistor, Fixed, Film: 30 k Ω , 5%, 1/4 W	1	CF1/4-30K/J	09021	
R6	Resistor, Fixed, Film: 100 k Ω , 5%, 1/4 W	1	CF1/4-100K/J	09021	
R7	Resistor, Fixed, Film: 220 Ω , 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	
R8	Resistor, Fixed, Film: 240 Ω , 5%, 1/4 W	1	CF1/4-240 OHMS/J	09021	
R9	Resistor, Fixed, Film: 330 k Ω , 5%, 1/4 W	2	CF1/4-330K/J	09021	
R10	Same as R9				
T1	Transformer, RF	1	T16-1	15542	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.4 TYPE 794598-1 IF DEMODULATOR MOTHERBOARD

REF DESIG PREFIX A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	2.1755 MHz/455 kHz Converter		794586-1	14632	
A2	IF Bandwidth Option		WJ-9926A-XXX	14632	
A3 Thru A6	Same as A2				
A7	455 kHz IF Amplifier		370817-1	14632	
A8	Wide Band/Narrow Band Filter		370816-1	14632	
A9	AM/FM/SSB Demodulator		794599-1	14632	
A10	AGC/Video/Squelch PW Assembly		794607-1	14632	
C1	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	3	34475-1	14632	
C2	Same as C1				
C3	Same as C1				
E1	Terminator, Coaxial	6	D-607-10	06090	
E2 Thru E6	Same as E1				
J1	Connector, Receptacle	1	65610-206	22526	
J2	Connector, Receptacle	3	225398-7	00779	
J3	Same as J2				
J4	Same as J2				
P1	Connector, Jack, SMB	1	2002-7571-005	19505	
P2	Same as P3				
P3	Connector, Plug	2	2105-7521-005	19505	
P4	Cable, Flat	1	FST-21A-20	15912	
P5	Cable, Jumper	1	FST-26A-14	15912	
XA1	Terminal, Strip	12	65500-112	22526	
XA2 Thru XA8	Same as XA1				
XA9A	Same as XA1				
XA9B	Same as XA1				
XA10A	Same as XA1				
XA10B	Same as XA1				

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.4.1 Type 794586-1 2.1755 MHz/455 kHz Converter

REF DESIG PREFIX A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 μ F, 20%, 50 V	5	34453-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	6	34475-1	14632	
C4	Same as C3				
C5	Capacitor, Ceramic, Monolithic: 470 pF, 5%, 100 V	1	8121-100-COGO-471J	59660	
C6 Thru C8	Same as C1				
C9	Same as C3				
C10	Capacitor, Ceramic, Disc: 0.47 μ F, 20%, 50 V	1	34452-1	14632	
C11	Same as C3				
C12	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM05FD151G03	81349	
C13	Capacitor, Mica, Dipped: 100 pF, 2%, 500 V	1	CM05FD101G03	81349	
C14	Capacitor, Mica, Dipped: 51 pF, 2%, 500 V	1	CM05ED510G03	81349	
C15	Same as C3				
C16	Same as C3				
C17	Capacitor, Ceramic, Monolithic: 3300 pF, \pm 2%, 100 V	2	200-100-NPO-332G	51642	
C18	Same as C17				
L1	Coil, Fixed: 18 μ H	1	1537-42	99800	
L2	Coil, Fixed: 1.2 mH	3	553-3635-38	71279	
L3	Same as L2				
L4	Same as L2				
L5	Coil, Fixed, Molded: 5.6 μ H	1	1025-38	99800	
P1	Connector, Plug	1	65001-010	22526	
Q1	Transistor	1	2N2857	80131	
Q2	Transistor	1	841001-1	14632	
Q3	Transistor	1	2N2222A	80131	
R1	Resistor, Fixed, Film: 51 Ω , 5%, 1/4 W	2	CF1/4-51 OHMS/J	09021	
R2	Resistor, Fixed, Film: 16 k Ω , 5%, 1/4 W	1	CF1/4-16K/J	09021	
R3	Resistor, Fixed, Film: 10 Ω , 5%, 1/4 W	2	CF1/4-10 OHMS/J	09021	
R4	Resistor, Fixed, Film: 4.7 k Ω , 5%, 1/4 W	1	CF1/4-4.7K/J	09021	
R5	Resistor, Fixed, Film: 470 Ω , 5%, 1/4 W	2	CF1/4-470 OHMS/J	09021	
R6	Resistor, Fixed, Film: 27 Ω , 5%, 1/4 W	1	CF1/4-27 OHMS/J	09021	
R7	Resistor, Fixed, Film: 220 Ω , 5%, 1/4 W	2	CF1/4-220 OHMS/J	09021	
R8	Resistor, Fixed, Film: 180 Ω , 5%, 1/4 W	1	CF1/4-180 OHMS/J	09021	
R9	Same as R5				
R10	Resistor, Fixed, Film: 150 k Ω , 5%, 1/4 W	1	CF1/4-150K/J	09021	
R11	Resistor, Fixed, Film: 18 k Ω , 5%, 1/4 W	1	CF1/4-18K/J	09021	
R12	Resistor, Fixed, Film: 100 k Ω , 5%, 1/4 W	1	CF1/4-100K/J	09021	
R13	Resistor, Fixed, Film: 620 Ω , 5%, 1/4 W	1	CF1/4-620 OHMS/J	09021	
R14	Resistor, Fixed, Film: 5.1 k Ω , 5%, 1/4 W	1	CF1/4-5.1K/J	09021	
R15	Same as R3				

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A4A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R16	Same as R7				
R17	Resistor, Fixed, Film: 47Ω, 5%, 1/4 W	1	CF1/4-47 OHMS	09021	
R18	Resistor, Fixed, Film: 100Ω, 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	
R19	Resistor, Fixed, Film: 9.1 kΩ, 5%, 1/4 W	1	CF1/4-9.1K/J	09021	
R20	Resistor, Fixed, Film: 13 kΩ, 5%, 1/4 W	1	CF1/4-13K/J	09021	
R21	Resistor, Fixed, Film: 2.0 kΩ, 5%, 1/4 W	1	CF1/4-2K/J	09021	
R22	Same as R1				
T1	Transformer, RF	1	T16-1	15542	
T2	Transformer, RF	1	T9-1	15542	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.4.2 Type 370817-1 455 kHz IF Amplifier

REF DESIG PREFIX A4A7

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 μ F, 20%, 50 V	4	34453-1	14632	
C2	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	6	34475-1	14632	
C3	Same as C1				
C4	Same as C2				
C5	Same as C2				
C6	Same as C1				
C7	Same as C1				
C8 Thru C10	Same as C2				
CR1	Diode	1	1N462A	80131	
L1	Coil, Fixed: 3.3 mH	2	553-3635-43	71279	
L2	Same as L1				
P1	Connector, Plug	1	65001-010	22526	
Q1	Transistor	2	841001-1	14632	
Q2	Same as Q1				
RT1	Thermistor	2	3D102	50157	
RT2	Same as RT1				
R1	Resistor, Fixed, Film: 120 k Ω , 5%, 1/4 W	1	CF1/4-120K/J	09021	
R2	Resistor, Fixed, Film: 10 k Ω , 5%, 1/4 W	1	CF1/4-10K/J	09021	
R3	Resistor, Fixed, Film: 150 k Ω , 5%, 1/4 W	2	CF1/4-150K/J	09021	
R4	Resistor, Fixed, Film: 4.7 k Ω , 5%, 1/4 W	2	CF1/4-4.7K/J	09021	
R5	Resistor, Fixed, Film: 22 k Ω , 5%, 1/4 W	2	CF1/4-22K/J	09021	
R6	Resistor, Fixed, Film: 330 Ω , 5%, 1/4 W	2	CF1/4-330 OHMS/J	09021	
R7	Resistor, Fixed, Film: 270 Ω , 5%, 1/4 W	2	CF1/4-270 OHMS/J	09021	
R8	Resistor, Fixed, Film: 100 Ω , 5%, 1/4 W	1	CF1/4-100 OHMS/J	09021	
R9	Resistor, Fixed, Film: 56 k Ω , 5%, 1/4 W	1	CF1/4-56K/J	09021	
R10	Same as R4				
R11	Same as R3				
R12	Resistor, Fixed, Film: 47 Ω , 5%, 1/4 W	1	CF1/4-47 OHMS	09021	
R13	Same as R5				
R14	Same as R6				
R15	Same as R7				
R16	Resistor, Variable, Film: 1 k Ω , 10%, 1/2 W	1	62PAR1K	73138	
R17	Resistor, Fixed, Film: 220 Ω , 5%, 1/4 W	1	CF1/4-220 OHMS/J	09021	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.4.3 **Type 370816-1 Wide Band/Narrow Band Filter**

REF DESIG PREFIX A4A8

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 μ F, 20%, 50 V	2	34453-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	12	34475-1	14632	
C4 Thru C14	Same as C3				
FL1	Filter, Ceramic	1	CFS-455I	51406	
FL2	Filter, Ceramic	1	CFR-455A	51406	
P1	Connector, Plug	1	65001-010	22526	
Q1	Transistor	4	2N2222A	80131	
Q2 Thru Q4	Same as Q1				
R1	Resistor, Fixed, Film: 22 k Ω , 5%, 1/4 W	4	CF1/4-22K/J	09021	
R2	Resistor, Fixed, Film: 6.8 k Ω , 5%, 1/4 W	4	CF1/4-6.8K/J	09021	
R3	Same as R1				
R4	Same as R2				
R5	Resistor, Fixed, Film: 1.0 k Ω , 5%, 1/4 W	3	CF1/4-1K/J	09021	
R6	Same as R5				
R7	Resistor, Fixed, Film: 2.0 k Ω , 5%, 1/4 W	1	CF1/4-2K/J	09021	
R8	Resistor, Fixed, Film: 1.1 k Ω , 5%, 1/4 W	1	CF1/4-1.1K/J	09021	
R9	Resistor, Fixed, Film: 220 Ω , 5%, 1/4 W	4	CF1/4-220 OHMS/J	09021	
R10 Thru R12	Same as R9				
R13	Resistor, Fixed, Film: 3.3 k Ω , 5%, 1/4 W	1	CF1/4-3.3K/J	09021	
R14	Resistor, Fixed, Film: 1.3 k Ω , 5%, 1/4 W	1	CF1/4-1.3K/J	09021	
R15	Same as R1				
R16	Same as R2				
R17	Same as R1				
R18	Same as R2				
R19	Resistor, Fixed, Film: 100 Ω , 5%, 1/4 W	2	CF1/4-100 OHMS/J	09021	
R20	Same as R5				
R21	Resistor, Fixed, Film: 47 Ω , 5%, 1/4 W	2	CF1/4-47 OHMS	09021	
R22	Same as R19				
R23	Same as R21				

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.4.4 Type 794599-1 AM/FM/SSB Demodulator

REF DESIG PREFIX A4A9

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	25	34475-1	14632	
C2 Thru C4	Same as C1				
C5	Capacitor, Mica, Dipped: 10 pF, 0.5 pF, 500 V	1	CM04CD100D03	81349	
C6 Thru C8	Same as C1				
C9	Capacitor, Mica, Dipped: 100 pF, 2%, 500 V	1	CM05FD101G03	81349	
C10	Same as C1				
C11	Capacitor, Ceramic, Disc: 0.022 μ F, 10%, 100 V	1	CK06BX223K	81349	
C12	Capacitor, Ceramic, Disc: 0.47 μ F, 20%, 50 V	3	34452-1	14632	
C13	Capacitor, Ceramic, Disc: 330 pF, 10%, 200 V	1	CK05BX331K	81349	
C14	Capacitor, Electrolytic, Tantalum: 18 μ F, 10%, 20 V	4	196D186X9020KE3	56289	
C15	Same as C14				
C16	Not Used				
C17 Thru C28	Same as C1				
C29	Same as C14				
C30	Capacitor, Electrolytic, Tantalum: 4.7 μ F, 20%, 35 V	1	196D475X0035JE3	56289	
C31	Capacitor, Ceramic, Disc: 2200 pF, 10%, 200 V	2	CK06BX222K	81349	
C32	Capacitor, Mica, Dipped: 15 pF, 5%, 500 V	1	CM04CD150J03	81349	
C33 Thru C35	Same as C1				
C36	Same as C31				
C37	Same as C1				
C38	Same as C14				
C39	Capacitor, Mica, Dipped: 24 pF, 5%, 500 V	1	CM04ED240J03	81349	
C40	Capacitor, Ceramic, Tubular: 15 pF, 5%, 500 V	1	301-000U2J0-150J	59660	
C41	Capacitor, Mica, Dipped: 510 pF, 2%, 500 V	1	DM15-511G	72136	
C42	Same as C1				
C43	Capacitor, Ceramic, Disc: 3300 pF, 10%, 200 V	1	CK06BX332K	81349	
C44	Capacitor, Mica, Dipped: 36 pF, 2%, 500 V	1	CM04ED360G03	81349	
C45	Capacitor, Ceramic, Disc: 2.2 μ F, 10%, 50 V	3	8141-050-651-225M	59660	
C46	Same as C45				
C47	Same as C45				
C48	Same as C12				
C49	Same as C12				
CR1	Diode	1	1N4449	80131	
CR2	Diode	2	5082-2800	28480	
CR3	Same as CR2				
L1	Coil, Fixed: 6.8 mH, 10%	3	553-3635-47	71279	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A4A9

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
L2	Same as L1				
L3	Same as L1				
L4	Coil, Variable	1	6740-41	04213	
P1	Connector, Plug	2	65001-010	22526	
P2	Same as P1				
Q1	Transistor	4	2N2222A	80131	
Q2	Transistor	1	2N3251	80131	
Q3 Thru Q5	Same as Q1				
R1	Resistor, Fixed, Film: 27 k Ω , 5%, 1/8 W	2	CF1/8-27K/J	09021	
R2	Resistor, Fixed, Film: 3.3 k Ω , 5%, 1/8 W	1	CF1/8-3.3K/J	09021	
R3	Resistor, Fixed, Film: 330 Ω , 5%, 1/8 W	1	CF1/8-330 OHMS/J	09021	
R4	Same as R3				
R5	Same as R3				
R6	Resistor, Fixed, Film: 220 Ω , 5%, 1/8 W	1	CF1/8-220 OHMS/J	09021	
R7	Resistor, Fixed, Film: 270 Ω , 5%, 1/8 W	1	CF1/8-270 OHMS/J	09021	
R8	Resistor, Fixed, Film: 4.7 k Ω , 5%, 1/8 W	2	CF1/8-4.7K/J	09021	
R9	Resistor, Fixed, Film: 100 Ω , 5%, 1/8 W	7	CF1/8-100 OHMS/J	09021	
R10	Resistor, Fixed, Film: 33 k Ω , 5%, 1/8 W	1	CF1/8-33K/J	09021	
R11	Resistor, Fixed, Film: 47 k Ω , 5%, 1/8 W	4	CF1/8-47K/J	09021	
R12	Same as R9				
R13	Resistor, Fixed, Film: 47 Ω , 5%, 1/8 W	1	CF1/8-47 OHMS/J	09021	
R14	Resistor, Fixed, Film: 15 k Ω , 5%, 1/8 W	1	CF1/8-15K/J	09021	
R15	Same as R3				
R16*	Resistor, Fixed, Film: 6.8 k Ω , 5%, 1/8 W	1	CF1/8-6.8K/J	09021	
R17	Same as R11				
R18	Same as R11				
R19	Same as R9				
R20	Same as R9				
R21	Not Used				
R22	Resistor, Fixed, Film: 130 k Ω , 5%, 1/8 W	2	CF1/8-130K/J	09021	
R23*	Resistor, Fixed, Film: 100 k Ω , 5%, 1/8 W	2	CF1/8-100K/J	09021	
R24	Not Used				
R25	Resistor, Fixed, Film: 470 Ω , 5%, 1/8 W	2	CF1/8-470 OHMS/J	09021	
R26	Same as R1				
R27	Same as R8				
R28	Same as R25				
R29	Same as R23				
R30	Same as R11				

* Nominal Value, Final Value Factory Selected.

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

REF DESIG PREFIX A4A9

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R31	Same as R22				
R32	Resistor, Fixed, Film: 5.1 kΩ, 5%, 1/8 W	2	CF1/8-5.1K/J	09021	
R33	Same as R9				
R34	Resistor, Fixed, Film: 3 kΩ, 5%, 1/8 W	2	CF1/8-3K/J	09021	
R35	Same as R9				
R36	Resistor, Fixed, Film: 3.9 kΩ, 5%, 1/8 W	3	CF1/8-3.9K/J	09021	
R37	Resistor, Fixed, Film: 150Ω, 5%, 1/8 W	1	CF1/8-150 OHMS/J	09021	
R38	Resistor, Fixed, Film: 10 kΩ, 5%, 1/8 W	2	CF1/8-10K/J	09021	
R39	Same as R36				
R40	Same as R36				
R41*	Resistor, Fixed, Film: 5.6 kΩ, 5%, 1/8 W	1	CF1/8-5.6K/J	09021	
R42	Resistor, Fixed, Film: 470 kΩ, 5%, 1/8 W	2	CF1/8-470K/J	09021	
R43	Same as R34				
R44	Same as R42				
R45	Same as R9				
R46	Same as R32				
R47*	Resistor, Fixed, Film: 14.7 kΩ, 1%, 1/10 W	1	RN55C1472F	81349	
R48	Resistor, Fixed, Film: 178 kΩ, 1%, .1 W	3	RN55C1783F	81349	
R49	Resistor, Fixed, Film: 10 kΩ, 1%, 1/10 W	1	RN55C1002F	81349	
R50	Same as R48				
R51	Resistor, Variable, Film: 5 kΩ, 10%, 1/2 W	1	62PAR5K	73138	
R52	Resistor, Fixed, Film: 51.1 kΩ, 1%, 1/10 W	2	RN55C5112F	81349	
R53	Same as R48				
R54	Same as R52				
R55	Resistor, Fixed, Film: 82.5 kΩ, 1%, 1/10 W	2	RN55C8252F	81349	
R56	Same as R55				
R57	Resistor, Fixed, Film: 10Ω, 5%, 1/4 W	2	CF1/4-10 OHMS/J	09021	
R58	Same as R57				
R59	Same as R3				
R60	Same as R38				
R61	Not Used				
R62	Resistor, Fixed, Film: 39 kΩ, 5%, 1/8 W	1	CF1/8-39K/J	09021	
T1	Transformer, RF	1	T16-1	15542	
U1	Integrated Circuit	1	TL064CN	01295	
U2	Integrated Circuit	1	DG212CJ	17856	
U3	Integrated Circuit	1	MC1596L	04713	
U4	Integrated Circuit	1	MC1357P	04713	
VR1	Diode Zener: 6.2 V	1	1N753A	80131	

* Nominal Value, Final Value Factory Selected.

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.4.5 Type 794607-1 AGC/Video/Squelch

REF DESIG PREFIX A4A10

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.47 μ F, 20%, 50 V	2	34452-1	14632	
C2	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	5	34475-1	14632	
C3	Capacitor, Electrolytic, Tantalum: 47 μ F, 10%, 20 V	1	CS13BE476K	81349	
C4	Capacitor, Electrolytic, Tantalum: 2.2 μ F, 20%, 35 V	1	196D225X0035JE3	56289	
C5	Capacitor, Electrolytic, Tantalum: 18 μ F, 10%, 20 V	2	196D186X9020KE3	56289	
C6	Same as C5				
C7	Capacitor, Ceramic, Disc: 1 μ F, 20%, 50 V	1	8131-050-651-105M	59660	
C8	Capacitor, Ceramic, Disc:	2	CK05BX151K	81349	
C9	Same as C1				
C10 Thru C12	Same as C2				
C13	Same as C8				
C14	Capacitor, Electrolytic, Aluminum: 100 μ F, +50%-10%, 25 V	2	ECE-A1EV101S	54473	
C15	Same as C14				
C16	Same as C2				
CR1	Diode	8	1N4449	80131	
CR2	Not Used				
CR3	Not Used				
CR4 Thru CR10	Same as CR1				
E1	Terminal, Forked	2	140-1941-02-01	71279	
E2	Same as E1				
P1	Connector, Plug	2	65001-010	22526	
P2	Same as P1				
Q1	Transistor	7	2N2222A	80131	
Q2 Thru Q7	Same as Q1				
R1	Resistor, Fixed, Film: 100 Ω , 5%, 1/4 W	5	CF1/4-100 OHMS/J	09021	
R2	Resistor, Fixed, Film: 47 Ω , 5%, 1/4 W	1	CF1/4-47 OHMS	09021	
R3	Resistor, Fixed, Film: 100 k Ω , 5%, 1/4 W	6	CF1/4-100K/J	09021	
R4	Resistor, Fixed, Film: 2.2 k Ω , 5%, 1/4 W	2	CF1/4-2.2K/J	09021	
R5	Resistor, Fixed, Film: 1.2 k Ω , 5%, 1/4 W	2	CF1/4-1.2K/J	09021	
R6	Resistor, Fixed, Film: 15 k Ω , 5%, 1/4 W	4	CF1/4-15K/J	09021	
R7	Resistor, Fixed, Film: 33 k Ω , 5%, 1/4 W	4	CF1/4-33K/J	09021	
R8	Same as R3				
R9	Resistor, Fixed, Film: 82 k Ω , 5%, 1/4 W	1	CF1/4-82K/J	09021	
R10	Same as R3				
R11	Resistor, Fixed, Film: 75 k Ω , 5%, 1/4 W	2	CF1/4-75K/J	09021	
R12	Same as R1				
R13	Resistor, Fixed, Film: 1.0 M Ω , 5%, 1/4 W	1	CF1/4-1M/J	09021	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

REF DESIG PREFIX A4A10

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R14	Resistor, Fixed, Film: 4.7 k Ω , 5%, 1/4 W	4	CF1/4-4.7K/J	09021	
R15	Same as R4				
R16	Resistor, Fixed, Film: 18 k Ω , 5%, 1/4 W	1	CF1/4-18K/J	09021	
R17	Resistor, Fixed, Film: 1.5 k Ω , 5%, 1/4 W	1	CF1/4-1.5K/J	09021	
R18	Resistor, Fixed, Film: 2.7 k Ω , 5%, 1/4 W	2	CF1/4-2.7K/J	09021	
R19	Resistor, Fixed, Film: 13 k Ω , 5%, 1/4 W	1	CF1/4-13K/J	09021	
R20	Not Used				
R21	Same as R6				
R22	Resistor, Fixed, Film: 120 k Ω , 5%, 1/4 W	1	CF1/4-120K/J	09021	
R23	Resistor, Fixed, Film: 470 Ω , 5%, 1/4 W	1	CF1/4-470 OHMS/J	09021	
R24	Same as R1				
R25	Resistor, Fixed, Film: 100 k Ω , 1%, 1/10 W	2	RN55C1003F	81349	
R26	Resistor, Fixed, Film: 47 k Ω , 5%, 1/4 W	5	CF1/4-47K/J	09021	
R27	Same as R7				
R28	Same as R3				
R29	Not Used				
R30	Resistor, Fixed, Film: 22 k Ω , 5%, 1/4 W	1	CF1/4-22K/J	09021	
R31	Resistor, Fixed, Film: 680 k Ω , 5%, 1/4 W		CF1/4-680K/J	09021	
R32	Resistor, Fixed, Film: 2.74 k Ω , 1%, 1/10 W	1	RN55C2741F	81349	
R33	Same as R7				
R34	Resistor, Variable, Film: 50 k Ω , 10%, 1/2 W	1	62PAR50K	73138	
R35	Same as R18				
R36	Resistor, Fixed, Film: 27 k Ω , 5%, 1/4 W	2	CF1/4-27K/J	09021	
R37	Same as R36				
R38	Resistor, Fixed, Film: 6.8 M Ω , 5%, 1/4 W	1	CF1/4-6.8M/J	09021	
R39	Same as R6				
R40	Same as R3				
R41	Same as R11				
R42	Resistor, Fixed, Film: 10 M Ω , 5%, 1/4 W	2	CF1/4-10M/J	09021	
R43	Same as R6				
R44	Same as R42				
R45	Same as R5				
R46	Same as R1				
R47	Same as R3				
R48	Same as R26				
R49	Same as R1				
R50	Same as R7				
R51	Resistor, Fixed, Film: 39 k Ω , 5%, 1/4 W	1	CF1/4-39K/J	09021	
R52	Resistor, Fixed, Film: 68 Ω , 5%, 1/4 W	1	CF1/4-68 OHMS/J	09021	
R53	Resistor, Fixed, Film: 510 Ω , 5%, 1/4 W	2	CF1/4-510 OHMS/J	09021	
R54	Same as R53				
R55	Same as R25				

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A4A10

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R56	Same as R26				
R57	Same as R14				
R58	Same as R26				
R59	Same as R14				
R60	Same as R26				
R61	Same as R14				
U1	Integrated Circuit	2	TL064CN	01295	
U2	Integrated Circuit	1	MC1741CP1	04713	
U3	Same as U1				
U4	Integrated Circuit	1	CD4053AE	02735	
U5	Integrated Circuit	1	MM74HC02N	27014	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.5 TYPE 794414-2 SYNTHESIZER MOTHERBOARD

REF DESIG PREFIX A5

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Reference Divider	1	794588-1	14632	
A2	1st LO Synthesizer	1	794593-2	14632	
A3	2nd LO Synthesizer	1	794590-1	14632	
A4	BFO Synthesizer	1	794416-2	14632	
C1	Capacitor, Electrolytic, Tantalum: 220 μ F, 20%, 10 V	1	196D227X0010TE4	56289	
C2	Capacitor, Electrolytic, Tantalum: 100 μ F, 20%, 20 V	2	196D107X0020TE4	56289	
C3	Same as C2				
C4	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	1	34475-1	14632	
J1	Connector, Receptacle	1	SS-120-G-2	55322	
J2	Connector, Receptacle	2	SS-116-G-2	55322	
J3	Same as J2				
J4	Connector, Receptacle: SMB	1	2010-1511-000	19505	
J5	Not Used				
L1	Coil, Fixed: 27 μ H	2	1537-48	99800	
L2	Ferrite Choke	1	VK200-10-3B	02114	
L3	Same as L1				
XA1	Terminal, Strip	1	65500-112	22526	
XA2	Terminal, Strip	1	65500-126	22526	
XA3A	Terminal, Strip	4	65500-120	22526	
XA3B	Same as XA3A				
XA4A	Same as XA3A				
XA4B	Same as XA3A				

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.5.1 Type 794588-1 Reference Divider

REF DESIG PREFIX A5A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.01 μ F, 20%, 50 V	2	34453-1	14632	
C2	Same as C1				
C3	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	8	34475-1	14632	
C4	Same as C3				
C5	Same as C3				
C6	Capacitor, Mica, Dipped: 30 pF, 2%, 500 V	1	CM05ED300G03	81349	
C7 Thru C11	Same as C3				
C12	Capacitor, Mica, Dipped: 10 pF, 0.5 pF, 500 V	2	CM05CD100D03	81349	
C13	Capacitor, Electrolytic, Tantalum: 220 μ F, 20%, 10 V	1	196D227X0010TE4	56289	
C14	Same as C12				
J1	Connector, Receptacle: SMB	1	2009-1511-000	19505	
J2	Jack, Tip (Green)	1	TJ206GN	49956	
P1	Connector, Plug	1	65001-010	22526	
Q1	Transistor	1	2N3478	80131	
Q2	Transistor	1	2N706	80131	
R1	Resistor, Fixed, Film: 51 Ω , 5%, 1/4 W	1	CF1/4-51 OHMS/J	09021	
R2	Resistor, Fixed, Film: 3.6 k Ω , 5%, 1/4 W	1	CF1/4-3.6K/J	09021	
R3	Resistor, Fixed, Film: 1.0 k Ω , 5%, 1/4 W	4	CF1/4-1K/J	09021	
R4	Resistor, Fixed, Film: 390 Ω , 5%, 1/4 W	2	CF1/4-390 OHMS/J	09021	
R5	Resistor, Fixed, Film: 10 Ω , 5%, 1/4 W	1	CF1/4-10 OHMS/J	09021	
R6	Same as R3				
R7	Same as R3				
R8	Resistor, Fixed, Film: 10 k Ω , 5%, 1/4 W	4	CF1/4-10K/J	09021	
R9	Same as R8				
R10	Same as R4				
R11	Same as R3				
R12	Same as R8				
R13	Same as R8				
R14	Resistor, Fixed, Film: 2.7 Ω , 5%, 1/4 W	1	CF1/4-2.7 OHMS/J	09021	
U1	Integrated Circuit	1	SN74S196N	01295	
U2	Integrated Circuit	1	SN74LS196N	01295	
U3	Integrated Circuit	1	MC14569BCP	04713	
U4	Integrated Circuit	3	MC14518BCP	04713	
U5	Same as U4				
U6	Same as U4				

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.5.2 Type 794593-1 1st LO Synthesizer

REF DESIG PREFIX A5A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	Phase Lock Loop	1	794589-1	14632	
A2	VCO Assembly	1	794594-1	14632	
L1	Coil, Fixed, Air	1	22292-152	14632	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.5.2.1 Type 794589-1 Phase Locked Loop

REF DESIG PREFIX A5A2A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	10	34475-1	14632	
C2	Capacitor, Ceramic, Disc: 0.1 μ F, 10%, 100 V	1	CK06BX104K	81349	
C3	Capacitor, Ceramic, Disc: 1000 pF, 10%, 100 V	4	8111-100-X7R0-102K	59660	
C4	Capacitor, Electrolytic, Tantalum: 18 μ F, 10%, 20 V	3	196D186X9020KE3	56289	
C5	Capacitor, Ceramic, Monolithic: 1600 pF, \pm 2%, 100 V	5	200-100-NPO-162G	51642	
C6	Capacitor, Ceramic, Disc: 0.33 μ F, 10%, 50 V	1	CK06BX334K	81349	
C7	Same as C3				
C8	Same as C4				
C9 Thru C13	Same as C1				
C14	Capacitor, Ceramic, Disc: 0.033 μ F, 10%, 100 V	1	CK06BX333K	81349	
C15	Same as C4				
C16	Same as C5				
C17	Same as C5				
C18	Same as C1				
C19	Capacitor, Electrolytic, Tantalum: 27 μ F, 10%, 35 V	1	196D276X9035TE4	56289	
C20	Same as C5				
C21	Same as C5				
C22	Same as C1				
C23	Same as C1				
C24	Capacitor, Ceramic, Tubular: 8.2 pF, .5 pF, 500 V	1	301-000COHO-829D	59660	
C25	Same as C3				
C26	Same as C3				
C27	Same as C1				
CR1	Diode	5	5082-2800	28480	
CR2 Thru CR5	Same as CR1				
E1	Terminal, Forked	9	140-1941-02-01	71279	
E2 Thru E9	Same as E1				
L1	Coil, Fixed: 680 μ H, 10%	1	553-3635-35	71279	
L2	Coil, Fixed, Air	1	22292-153	14632	
P1	Connector, Plug	1	65001-038	22526	
R1	Resistor, Fixed, Film: 3.6 k Ω , 5%, 1/8 W	2	CF1/8-3.6K/J	09021	
R2	Resistor, Fixed, Film: 1.5 k Ω , 5%, 1/8 W	2	CF1/8-1.5K/J	09021	
R3	Resistor, Fixed, Film: 100 Ω , 5%, 1/8 W	2	CF1/8-100 OHMS/J	09021	
R4	Same as R2				
R5	Resistor, Fixed, Film: 390 Ω , 5%, 1/8 W	1	CF1/8-390 OHMS/J	09021	
R6	Resistor, Fixed, Film: 68 k Ω , 5%, 1/8 W	1	CF1/8-68K/J	09021	
R7	Resistor, Fixed, Film: 1.0 k Ω , 5%, 1/8 W	1	CF1/8-1.0K/J	09021	
R8	Resistor, Fixed, Film: 9.09 k Ω , 1%, 1/10 W	2	RN55C9091F	81349	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

REF DESIG PREFIX A5A2A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R9	Resistor, Fixed, Film: 1.0 kΩ, 1%, 1/10 W	1	RN55C1001F	81349	
R10	Same as R8				
R11	Resistor, Fixed, Film: 51 kΩ, 5%, 1/8 W	1	CF1/8-51K/J	09021	
R12	Same as R1				
R13	Resistor, Fixed, Film: 681Ω, 1%, 1/10 W	2	RN55C6810F	81349	
R14	Same as R3				
R15	Same as R13				
R16	Resistor, Fixed, Film: 270 kΩ, 5%, 1/8 W	1	CF1/8-270K/J	09021	
R17	Resistor, Fixed, Film: 8.2 kΩ, 5%, 1/8 W	2	CF1/8-8.2K/J	09021	
R18	Resistor, Fixed, Film: 5.11 kΩ, 1%, 1/10 W	4	RN55C5111F	81349	
R19	Resistor, Fixed, Film: 100 kΩ, 5%, 1/8 W	2	CF1/8-100K/J	09021	
R20	Resistor, Fixed, Film: 15 kΩ, 5%, 1/8 W	1	CF1/8-15K/J	09021	
R21	Not Used				
R22	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	1	CF1/8-150K/J	09021	
R23	Same as R19				
R24	Same as R17				
R25					
Thru R27	Same as R18				
U1	Integrated Circuit	1	SN74ALS00N	01295	
U2	Integrated Circuit	1	SP8690B/DG	52648	
U3	Integrated Circuit	4	SN74ALS168N	01295	
U4					
Thru U6	Same as U3				
U7	Integrated Circuit	1	MC4044P	04713	
U8	Integrated Circuit	1	NE5534N	18324	
U9	Integrated Circuit	4	MC14560BCP	04713	
U10					
Thru U12	Same as U9				
U13	Integrated Circuit	1	TL064CN	01295	
U14	Integrated Circuit	1	CA3140AE	02735	
U15	Integrated Circuit	1	SP8604B/CM	52648	
VR1	Diode Zener: 3.3 V	1	1N746A	80131	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.5.2.2 Type 794594-1 VCO Assembly

REF DESIG PREFIX A5A2A2

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
A1	VCO	1	371693-1	14632	
C1	Capacitor, Ceramic, Feedthru: 1000 pF, GMV, 500 V	1	54-794-009-102W	33095	
C2	Capacitor, Ceramic, Feedthru: 0.05 μF, GMV, 300 V	3	54-785-002-503P	33095	
C3	Capacitor, Ceramic, Feedthru:	3	10122-1	51642	
C4	Same as C3				
C5	Same as C3				
C6	Not Used				
C7	Same as C2				
C8	Same as C2				
C9	Capacitor, Ceramic, Disc: 0.47 μF, 20%, 50 V	1	34452-1	14632	
E1	Terminal, Feedthru, Insulated	3	SFU16Y	04013	
E2	Same as E1				
E3	Same as E1				
E4	Connector, Bulkhead	1	8144-7521-005	19505	
E5	Terminal, Forked	1	140-1941-02-01	71279	
P1	Connector, Jack, SMB	1	2002-7571-005	19505	
R1	Resistor, Fixed, Film: 27 Ω, 5%, 1/8 W	1	CF1/8-27 OHMS/J	09021	
R2	Resistor, Fixed, Film: 1.2 kΩ, 5%, 1/8 W	3	CF1/8-1.2K/J	09021	
R3	Same as R2				
R4	Same as R2				
U1	Voltage Regulator	1	UA7812UC	07263	
W1	Cable Assembly	1	271146-2	14632	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.5.2.2.1 Part 371693-1 VCO

REF DESIG PREFIX A5A2A2A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 1000 pF, GMV, 500 V	9	59Z5U102P	91984	
C2	Capacitor, Ceramic, Tubular: 15 pF, 5%, 500 V	1	301-000C0G0-150J	59660	
C3	Capacitor, Variable, Air: .8-10.0 pF, 250 V	1	5201/W HDW	91293	
C4	Capacitor, Ceramic, Disc: 470 pF, $\pm 20\%$, 1000 Vdc	3	8381KVZ5U470	59660	
C5	Capacitor, Ceramic, Tubular: 5.1 pF, $\pm .5$ pF, 500 V	1	301-000COHO-519D	59660	
C6	Same as C1				
C7	Capacitor, Ceramic, Tubular: 10 pF, ± 0.5 pF, 500 V	1	301-000COHO-100D	59660	
C8	Same as C4				
C9					
Thru C11	Same as C1				
C12	Same as C4				
C13					
Thru C16	Same as C1				
C17	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	3	34475-1	14632	
C18	Same as C17				
C19	Same as C17				
C20	Capacitor, Electrolytic, Tantalum: 18 μ F, 10%, 20 V	1	196D186X9020KE3	56289	
CR1	Diode, Varicap	1	KV3901	52673	
CR2	Diode	3	5082-3188	28480	
CR3	Same as CR2				
CR4	Same as CR2				
E1	Terminal, Forked	8	140-1941-02-01	71279	
E2					
Thru E8	Same as E1				
L1	Resistor, Variable, Precision: 1.2 μ H, 10%	1	1537-14	99800	
L2	Coil, Fixed, Toroidal	1	20681-217	14632	
L3	Coil, Fixed, Toroidal	2	20681-218	14632	
L4	Same as L3				
Q1	Transistor	1	U310	17856	
Q2	Transistor	1	2N3906	80131	
R1	Resistor, Fixed, Film: 22 k Ω , 5%, 1/8 W	4	CF1/8-22K/J	09021	
R2	Resistor, Fixed, Film: 10 Ω , 5%, 1/8 W	1	CF1/8-10 OHMS/J	09021	
R3	Resistor, Fixed, Film: 330 Ω , 5%, 1/8 W	2	CF1/8-330 OHMS/J	09021	
R4	Resistor, Fixed, Film: 220 Ω , 5%, 1/8 W	1	CF1/8-220 OHMS/J	09021	
R5	Resistor, Fixed, Film: 3 k Ω , 5%, 1/8 W	1	CF1/8-3K/J	09021	
R6	Resistor, Fixed, Film: 3.9 k Ω , 5%, 1/4 W	1	CF1/4-3.9K/J	09021	
R7	Resistor, Fixed, Film: 100 Ω , 5%, 1/8 W	3	CF1/8-100 OHMS/J	09021	
R8	Same as R3				
R9					
Thru R11	Same as R1				

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A5A2A2A1

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R12	Same as R7				
R13	Resistor, Fixed, Film: 68Ω, 5%, 1/8 W	1	CF1/8-68 OHMS/J	09021	
R14	Same as R7				
R15	Resistor, Fixed, Film: 150 kΩ, 5%, 1/8 W	1	CF1/8-150K/J	09021	
R16	Not Used				
R17	Resistor, Fixed, Film: 4.7 kΩ, 5%, 1/8 W	1	CF1/8-4.7K/J	09021	
R18	Resistor, Fixed, Film: 39Ω, 5%, 1/8 W	1	CF1/8-39 OHMS/J	09021	
R19	Resistor, Fixed, Film: 2.7 kΩ, 5%, 1/8 W	1	CF1/8-2.7K/J	09021	
R20	Resistor, Fixed, Film: 150Ω, 5%, 1/8 W	2	CF1/8-150 OHMS/J	09021	
R21	Resistor, Fixed, Film: 36Ω, 5%, 1/8 W	2	CF1/8-36 OHMS/J	09021	
R22	Same as R20				
R23	Resistor, Fixed, Film: 33Ω, 5%, 1/8 W	1	CF1/8-33 OHMS/J	09021	
R24	Resistor, Fixed, Film: 27Ω, 5%, 1/8 W	1	CF1/8-27 OHMS/J	09021	
T1	Transformer	1	21428-95	14632	
T2	Transformer	1	21278-30	14632	
U1	Integrated Circuit	1	SP8793DP	52648	
U2	Amplifier, Buffer	1	LH0002CH	27014	
VR1	Diode Zener: 4.3 V	1	1N749A	80131	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.5.3 Type 794590-1 2nd LO Synthesizer

REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 μ F, 10%, 50 V	15	8121-050-X7RO-104K	59660	
C2	Capacitor, Ceramic, Disc: 0.47 μ F, 10%, 50 V	12	8131-050-X7RO-474K	59660	
C3	Same as C2				
C4	Same as C2				
C5	Same as C1				
C6	Same as C1				
C7	Not Used				
C8	Capacitor, Ceramic, Disc: 2200 pF, 10%, 50 V	11	8121-050-X7RO-222K	59660	
C9 Thru C12	Same as C8				
C13	Capacitor, Ceramic, Disc: 120 pF, 5%, 50 V	2	8121-050-COGO-121J	59660	
C14	Capacitor, Ceramic, Disc: 27 pF, 5%, 50 V	1	8111-050-COGO-270J	59660	
C15	Same as C8				
C16	Same as C2				
C17	Same as C8				
C18	Capacitor, Ceramic, Disc: 15 pF, 5%, 50 V	2	8101-050-COGO-150J	59660	
C19	Capacitor, Variable, Air: 1.0-10 pF, 250 V	3	8052	91293	
C20	Capacitor, Ceramic, Disc: 2.2 pF, \pm 0.1 pF, 50 V	4	8101-050-COJO-229B	59660	
C21	Capacitor, Ceramic, Disc: 39 pF, 5%, 50 V	1	8111-050-COGO-390J	59660	
C22	Capacitor, Ceramic, Disc: 200 pF, 5%, 50 V	2	8121-050-COGO-201J	59660	
C23	Capacitor, Ceramic, Disc: 1100 pF, 5%, 50 V	2	8121-050-COGO-112J	59660	
C24	Same as C23				
C25	Same as C1				
C26	Not Used				
C27	Same as C1				
C28	Capacitor, Electrolytic, Tantalum: 100 μ F, 10%, 10 Vdc	2	196D107X0010PE4	56289	
C29	Capacitor, Electrolytic, Tantalum: 220 μ F, 20%, 10 V	1	196D227X0010TE4	56289	
C30	Same as C2				
C31	Capacitor, Ceramic, Disc: 0.01 pF, 10%, 50 V	1	8121-050-X7RO-103K	59660	
C32	Same as C2				
C33	Capacitor, Ceramic, Monolithic: 10 pF, \pm 5%, 100 V	1	100-100-NPO-100J	51642	
C34	Same as C8				
C35	Same as C2				
C36	Same as C8				
C37	Same as C20				
C38	Same as C8				
C39	Capacitor, Ceramic, Disc: 43 pF, 5%, 50 V	1	8111-050-COGO-430J	59660	
C40	Same as C22				
C41	Capacitor, Ceramic, Disc: 24 pF, 5%, 50 V	1	8111-050-COGO-240J	59660	
C42	Same as C8				
C43	Same as C13				

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C44	Same as C19				
C45	Same as C20				
C46	Same as C1				
C47	Not Used				
C48	Not Used				
C49	Same as C1				
C50	Capacitor, Ceramic, Disc: 0.1 μ F, 10%, 100 V	2	CKC6BX104K	81349	
C51	Same as C2				
C52	Same as C2				
C53	Same as C50				
C54	Same as C2				
C55	Capacitor, Ceramic, Disc: 330 pF, 10%, 100 V	8	8101-100-X7RO-331K	59660	
C56	Same as C2				
C57	Same as C55				
C58	Same as C20				
C59	Capacitor, Composition, Tubular: 0.51 pF, 10%, 500 V	1	QC0.51PFK	95121	
C60	Same as C55				
C61	Same as C19				
C62	Same as C18				
C63	Same as C2				
C64	Same as C55				
C65	Same as C1				
C66	Same as C55				
C67	Not Used				
C68	Same as C55				
C69	Not Used				
C70	Same as C1				
C71	Not Used				
C72	Same as C1				
C73	Same as C55				
C74	Same as C55				
C75 Thru C79	Same as C1				
C80	Same as C28				
C81	Capacitor, Electrolytic, Tantalum: 4.7 μ F, 20%, 35 V	3	196D475X0035JE3	56289	
C82	Capacitor, Electrolytic, Tantalum: 22 μ F, 20%, 10 V	1	196D226X0010JE3	56289	
C83	Same as C81				
C84	Capacitor, Electrolytic, Tantalum: 1 μ F, 20%, 35 V	1	196D105X0035HE3	56289	
C85	Same as C81				
C86	Capacitor, Ceramic, Disc: 0.01 μ F, 20%, 50 V	2	34453-1	14632	
C87	Same as C86				

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
CR1	Diode, Varicap	2	KV3901	52673	
CR2	Not Used				
CR3	Same as CR1				
CR4	Diode	1	U11-3102	52673	
CR5	Diode	8	5082-2800	28480	
CR6 Thru CR12	Same as CR5				
E1	Terminal, Forked	3	140-1941-02-01	71279	
E2	Same as E1				
E3	Same as E1				
J1	Connector, Receptacle: SMB	1	2010-1511-000	19505	
JW1	Busswire		8021 22 AWG	70903	
L1	Coil, Fixed, Molded: 15 μ H	4	1025-48	99800	
L2	Coil, Fixed, Molded: 1.8 μ H	2	1537-18	99800	
L3	Coil, Fixed, Molded: 100 μ H	1	553-3635-25	71279	
L4	Same as L1				
L5	Coil, Fixed: 2.2 μ H	3	1025-28	99800	
L6	Coil, Fixed, Molded: 5.6 μ H	1	1025-38	99800	
L7	Not Used				
L8	Same as L2				
L9	Same as L1				
L10	Same as L5				
L11	Same as L1				
L12	Not Used				
L13	Same as L5				
L14	Not Used				
L15	Coil	1	21210-37	14632	
L16	Coil, Fixed, Molded: 1.0 μ H	1	1025-20	99800	
P1	Connector, Plug	2	65001-026	22526	
P2	Same as P1				
Q1	Transistor	3	U310	17856	
Q2	Transistor	3	2N2857	80131	
Q3	Same as Q2				
Q4	Not Used				
Q5	Same as Q2				
Q6	Same as Q1				
Q7	Not Used				
Q8	Same as Q1				
Q9	Transistor	1	2N3904	80131	
R1	Resistor, Fixed, Film: 3.3 k Ω , 5%, 1/8 W	6	CF1/8-3.3K/J	09021	
R2	Resistor, Fixed, Film: 27 k Ω , 5%, 1/8 W	2	CF1/8-27K/J	09021	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R3	Resistor, Fixed, Film: 3 k Ω , 5%, 1/8 W	1	CF1/8-3K/J	09021	
R4	Resistor, Fixed, Film: 15 k Ω , 5%, 1/8 W	2	CF1/8-15K/J	09021	
R5	Resistor, Fixed, Film: 2.2 k Ω , 5%, 1/8 W	8	CF1/8-2.2K/J	09021	
R6	Resistor, Fixed, Film: 100 Ω , 5%, 1/8 W	5	CF1/8-100 OHMS/J	09021	
R7	Resistor, Fixed, Film: 10 k Ω , 5%, 1/8 W	2	CF1/8-10K/J	09021	
R8	Resistor, Fixed, Film: 68 k Ω , 5%, 1/8 W	1	CF1/8-68K/J	09021	
R9	Resistor, Fixed, Film: 1.0 k Ω , 5%, 1/8 W	3	CF1/8-1.0K/J	09021	
R10	Resistor, Fixed, Film: 300 Ω , 5%, 1/8 W	2	CF1/8-300 OHMS/J	09021	
R11	Resistor, Fixed, Film: 22 k Ω , 5%, 1/8 W	5	CF1/8-22K/J	09021	
R12	Resistor, Fixed, Film: 13 k Ω , 5%, 1/8 W	1	CF1/8-13K/J	09021	
R13	Resistor, Fixed, Film: 4.3 k Ω , 5%, 1/8 W	3	CF1/8-4.3K/J	09021	
R14	Resistor, Fixed, Film: 22 Ω , 5%, 1/8 W	2	CF1/8-22 OHMS/J	09021	
R15	Resistor, Fixed, Film: 910 Ω , 5%, 1/8 W	1	CF1/8-910 OHMS/J	09021	
R16	Resistor, Fixed, Film: 240 Ω , 5%, 1/8 W	1	CF1/8-240 OHMS/J	09021	
R17	Resistor, Fixed, Film: 30 Ω , 5%, 1/8 W	2	CF1/8-30 OHMS/J	09021	
R18	Resistor, Fixed, Film: 27 Ω , 5%, 1/8 W	1	CF1/8-27 OHMS/J	09021	
R19	Same as R17				
R20	Resistor, Fixed, Composition: 51 Ω , 5%, 1/8 W	1	RCR05G510JS	81349	
R21	Resistor, Fixed, Film: 68 k Ω , 5%, 1/8 W	2	CF1/8-68K/J	09021	
R22	Same as R7				
R23	Resistor, Fixed, Film: 4.7 Ω , 5%, 1/8 W	1	CF1/8-4.7 OHMS/J	09021	
R24*	Resistor, Fixed, Film: 1.2 k Ω , 5%, 1/8 W	2	CF1/8-1.2K/J	09021	
R25	Resistor, Fixed, Film: 10 Ω , 5%, 1/8 W	2	CF1/8-10 OHMS/J	09021	
R26	Resistor, Fixed, Film: 330 Ω , 5%, 1/8 W	1	CF1/8-330 OHMS/J	09021	
R27*	Same as R24				
R28*	Resistor, Fixed, Film: 820 Ω , 5%, 1/8 W	1	CF1/8-820 OHMS/J	09021	
R29	Same as R6				
R30	Same as R1				
R31	Same as R1				
R32	Same as R11				
R33	Same as R13				
R34	Resistor, Fixed, Film: 16 k Ω , 5%, 1/8 W	2	CF1/8-16K/J	09021	
R35	Same as R5				
R36	Same as R11				
R37	Same as R34				
R38	Resistor, Fixed, Film: 2.7 k Ω , 5%, 1/8 W	1	CF1/8-2.7K/J	09021	
R39	Same as R14				
R40	Resistor, Fixed, Film: 470 Ω , 5%, 1/8 W	1	CF1/8-470 OHMS/J	09021	
R41	Same as R10				
R42	Resistor, Fixed, Film: 33 k Ω , 5%, 1/8 W	1	CF1/8-33K/J	09021	

* Nominal Value, Final Value Factory Selected.

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R43	Same as R6				
R44	Same as R2				
R45	Resistor, Fixed, Film: 2 k Ω , 5%, 1/8 W	1	CF1/8-2K/J	09021	
R46	Same as R5				
R47	Same as R5				
R48	Same as R6				
R49	Same as R11				
R50	Same as R13				
R51	Resistor, Fixed, Film: 39 k Ω , 5%, 1/8 W	1	CF1/8-39K/J	09021	
R52	Same as R5				
R53	Same as R6				
R54	Resistor, Fixed, Film: 47 k Ω , 5%, 1/8 W	2	CF1/8-47K/J	09021	
R55	Resistor, Fixed, Film: 220 Ω , 5%, 1/8 W	1	CF1/8-220 OHMS/J	09021	
R56	Same as R11				
R57	Resistor, Fixed, Film: 47 Ω , 5%, 1/8 W	2	CF1/8-47 OHMS/J	09021	
R58	Same as R57				
R59	Same as R9				
R60	Not Used				
R61	Same as R1				
R62	Same as R1				
R63	Same as R9				
R64	Same as R21				
R65	Resistor, Fixed, Film: 1.5 k Ω , 5%, 1/8 W	2	CF1/8-1.5K/J	09021	
R66	Same as R5				
R67	Resistor, Fixed, Film: 3.6 k Ω , 5%, 1/8 W	2	CF1/8-3.6K/J	09021	
R68	Same as R65				
R69	Same as R67				
R70	Resistor, Fixed, Film: 560 Ω , 5%, 1/8 W	1	CF1/8-560 OHMS/J	09021	
R71	Same as R1				
R72	Same as R5				
R73	Same as R5				
R74	Same as R25				
R75	Resistor, Fixed, Film: 100 k Ω , 5%, 1/8 W	5	CF1/8-100K/J	09021	
R76 Thru R79	Same as R75				
R80	Same as R54				
R81	Same as R4				
U1	Integrated Circuit	1	MC4044P	04713	
U2	Integrated Circuit	2	MC1458N	18324	
U3	Integrated Circuit	1	MB503	00000	
U4	Integrated Circuit	2	MM74C932N	27014	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A5A3

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U5	Integrated Circuit	1	MC1741CP1	04713	
U6	Integrated Circuit	1	SP8792/DP	56248	
U7	Integrated Circuit	1	SN74LS290N	01295	
U8	Integrated Circuit	1	MM74HC390N	27014	
U9	Integrated Circuit	1	SP8690B/DG	52648	
U10	Integrated Circuit	2	SN74ALS168N	01295	
U11	Same as U10				
U12	Integrated Circuit	3	SN74LS169N	01295	
U13	Same as U12				
U14	Same as U12				
U15	Mixer, Balanced	1	M6D	27956	
U16	Same as U4				
U17	Not Used				
U18	Same as U2				

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

5.5.5.4 Type 794416-2 BFO Synthesizer

REF DESIG PREFIX A5A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	11	34475-1	14632	
C2	Capacitor, Electrolytic, Tantalum: 18 μ F, 10%, 20 V	3	196D186X9020KE3	56289	
C3	Capacitor, Ceramic, Disc: 0.01 μ F, 20%, 50 V	6	34453-1	14632	
C4	Same as C2				
C5	Same as C1				
C6	Same as C2				
C7	Same as C1				
C8	Capacitor, Variable, Ceramic: 2.5-11 pF, 350 V	1	538-011B2.5-11	59660	
C9	Capacitor, Mica, Dipped: 82 pF, 2%, 500 V	1	CM05ED820G03	81349	
C10	Capacitor, Mica, Dipped: 680 pF, 2%, 300 V	1	DM15-681G	72136	
C11	Same as C10				
C12	Capacitor, Ceramic, Disc: 0.47 μ F, 20%, 50 V	1	34452-1	14632	
C13	Capacitor, Mica, Dipped: 150 pF, 2%, 500 V	1	CM05FD151G03	81349	
C14	Same as C3				
C15	Same as C1				
C16	Not Used				
C17	Same as C1				
C18	Same as C2				
C19	Capacitor, Polycarbonate, Foil: 6800 pF, 2%, 100 V	1	PE51-.0068-100-2	27735	
C20	Capacitor, Polycarbonate, Foil: 0.015 μ F, 2%, 100 V	1	PE51-.015-100-2	27735	
C21					
Thru C26	Same as C1				
C27					
Thru C44	Not Used				
C45					
Thru C48	Same as C3				
C49	Capacitor, Ceramic, Disc: 68 pF, 5%, 100 V	1	8121-100-COGO-680J	59660	
CR1	Diode, Varicap	2	KV3901	52673	
CR2	Same as CR1				
CR3	Diode	3	1N4446	80131	
CR4	Same as CR3				
CR5	Same as CR3				
CR6	Not Used				
CR7	Not Used				
E1	Terminal, Forked	2	140-1941-02-01	71279	
E2	Same as E1				
FB1	Not Used				
FB2	Not Used				
L1	Coil, Fixed: 15 μ H	1	1537-40	99800	
L2	Coil, Fixed: 22 μ H	1	1537-44	99800	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A5A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
L3	Coil, Fixed, Molded: 27 μ H	1	1025-54	99800	
L4 Thru L6	Not Used				
P1	Connector, Plug	2	65001-026	22526	
P2	Same as P1				
Q1	Transistor	1	U310	17856	
Q2	Transistor	1	2N2222A	80131	
Q3 Thru Q5	Not Used				
R1	Resistor, Fixed, Film: 33 k Ω , 5%, 1/4 W	3	CF1/4-33K/J	09021	
R2	Same as R1				
R3	Resistor, Fixed, Film: 300 k Ω , 5%, 1/4 W	1	CF1/4-300K/J	09021	
R4	Resistor, Fixed, Film: 62 k Ω , 5%, 1/4 W	1	CF1/4-62K/J	09021	
R5	Resistor, Fixed, Film: 330 k Ω , 5%, 1/4 W	1	CF1/4-330K/J	09021	
R6	Resistor, Fixed, Film: 22 k Ω , 5%, 1/4 W	1	CF1/4-22K/J	09021	
R7	Same as R1				
R8	Resistor, Fixed, Film: 100 k Ω , 5%, 1/4 W	1	CF1/4-100K/J	09021	
R9	Resistor, Fixed, Film: 47 Ω , 5%, 1/4 W	1	CF1/4-47 OHMS	09021	
R10	Resistor, Fixed, Film: 330 Ω , 5%, 1/4 W	1	CF1/4-330 OHMS/J	09021	
R11	Resistor, Fixed, Film: 6.8 k Ω , 5%, 1/4 W	1	CF1/4-6.8K/J	09021	
R12	Resistor, Fixed, Film: 1.0 k Ω , 5%, 1/4 W	2	CF1/4-1K/J	09021	
R13	Same as R12				
R14	Not Used				
R15	Not Used				
R16	Resistor, Fixed, Film: 10 k Ω , 5%, 1/4 W	2	CF1/4-10K/J	09021	
R17	Same as R16				
R18	Resistor, Fixed, Film: 3.3 k Ω , 5%, 1/4 W	1	CF1/4-3.3K/J	09021	
R19	Resistor, Fixed, Film: 270 Ω , 5%, 1/4 W	1	CF1/4-270 OHMS/J	09021	
R20 Thru R37	Not Used				
U1	Integrated Circuit	2	MM74C932N	27014	
U2	Integrated Circuit	1	MC1741CP1	04713	
U3	Integrated Circuit	1	CD4013BE	02735	
U4	Integrated Circuit	1	CD4082BE	02735	
U5	Integrated Circuit	2	CD4002BE	02735	
U6	Integrated Circuit	1	CD4030BE	02735	
U7	Integrated Circuit	4	MC14510BCP	04713	
U8 Thru U10	Same as U7				
U11	Same as U5				

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

REF DESIG PREFIX A5A4

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U12	Integrated Circuit	1	SN74LS169N	01295	
U13	Integrated Circuit	1	SN74LS290N	01295	
U14 Thru U16	Not Used				
Y1	Not Used				

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

5.5.6 TYPE 794600-1 DIGITAL INTERFACE

REF DESIG PREFIX A6

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
C1	Capacitor, Electrolytic, Tantalum: 4.7 μ F, 20%, 35 V	3	196D475X0035JE3	56289	
C2	Same as C1				
C3	Same as C1				
C4	Capacitor, Ceramic, Disc: 0.1 μ F, 20%, 50 V	9	34475-1	14632	
C5	Not Used				
C6	Capacitor, Ceramic, Disc: 0.01 μ F, 20%, 50 V	2	34453-1	14632	
C7	Same as C4				
C8	Same as C6				
C9	Capacitor, Ceramic, Disc: 68 pF, 10%, 200 V	1	CK05BX680K	81349	
C10	Same as C4				
C11	Capacitor, Ceramic, Disc: 330 pF, 10%, 50 V	1	8101-050-X7RO-331K	59660	
C12	Capacitor, Electrolytic, Tantalum: 100 μ F, 20%, 20 V	2	196D107X0020TE4	56289	
C13	Capacitor, Ceramic, Disc: 2.2 pF, 10%, 50 V	1	8141-050-651-225M	59660	
C14	Same as C12				
C15	Capacitor, Ceramic, Disc: 0.47 μ F, 20%, 50 V	1	34452-1	14632	
C16 Thru C21	Same as C4				
CR1	Diode	3	5082-2800	28480	
CR2	Same as CR1				
CR3	Same as CR1				
E1	Terminal, Strip	9	65500-103	22526	
E2 Thru E9	Same as E1				
J1	Connector, Receptacle	1	65624-214	22526	
J2	Connector, Receptacle	1	SS-120-G-2	55322	
J3	Connector, Receptacle	1	SS-116-G-2	55322	
J4	Connector, Receptacle	1	65624-220	22526	
JW1	Connector, Plug	4	65474-001	22526	
JW2 Thru JW4	Same as JW1				
P1	Terminal, Strip	1	TS-120-G-AA	55332	
P2	Terminal, Strip	2	TS-116-G-AA	55332	
P3	Same as P2				
Q1	Transistor	1	2N2907/JAN	81350	
R1	Resistor, Fixed, Fuse: 2.7 Ω , 5%, 1/4 W	2	BW1/4F 2.7OHMS	56637	
R2	Same as R1				
R3	Resistor, Fixed, Film: 560 Ω , 5%, 1/8 W	2	CF1/8-560 OHMS/J	09021	
R4	Resistor, Fixed, Film: 3.0 k Ω , 5%, 1/8 W	2	CF1/8-3.0K/J	09021	
R5	Same as R4				
R6	Resistor, Fixed, Film: 6.8 k Ω , 5%, 1/8 W	1	CF1/8-6.8K/J	09021	

REPLACEMENT PARTS LIST

WJ-8625-1 VLF RECEIVER

REF DESIG PREFIX A6

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
R7	Resistor, Fixed, Film: 220 k Ω , 5%, 1/8 W	2	CF1/8-220K/J	09021	
R8	Resistor, Fixed, Film: 100 k Ω , 5%, 1/8 W	3	CF1/8-100K/J	09021	
R9	Resistor, Fixed, Film: 120 k Ω , 5%, 1/8 W	1	CF1/8-120K/J	09021	
R10	Resistor, Fixed, Film: 33 k Ω , 5%, 1/8 W	1	CF1/8-33K/J	09021	
R11	Same as R3				
R12	Resistor, Fixed, Film: 47 Ω , 5%, 1/8 W	2	CF1/8-47 OHMS/J	09021	
R13	Resistor, Fixed, Film: 470 k Ω , 5%, 1/8 W	1	CF1/8-470K/J	09021	
R14	Resistor, Fixed, Film: 4.7 k Ω , 5%, 1/8 W	8	CF1/8-4.7K/J	09021	
R15	Same as R14				
R16	Same as R12				
R17	Same as R14				
R18	Same as R14				
R19	Same as R8				
R20	Resistor, Fixed, Film: 75 k Ω , 5%, 1/8 W	1	CF1/8-75K/J	09021	
R21	Resistor, Fixed, Film: 10 k Ω , 5%, 1/8 W	1	CF1/8-10K/J	09021	
R22	Same as R8				
R23	Resistor, Fixed, Film: 56.2 k Ω , 1%, 1/10 W	1	RN55C5622F	81349	
R24	Resistor, Fixed, Film: 100 k Ω , 1%, 1/10 W	1	RN55C1003F	81349	
R25	Resistor, Variable, Film: 200 k Ω , 10%, 1/2 W	1	62PR200K	73138	
R26	Same as R14				
R27	Resistor, Fixed, Film: 10 k Ω , 1%, 1/10 W	1	RN55C1002F	81349	
R28	Resistor, Trimmer, Film: 50 k Ω , 10%, 1/2 W	1	62PR50K	73138	
R29	Same as R14				
R30	Resistor, Fixed, Film:	1	CF1/8-750K/J	09021	
R31	Resistor, Fixed, Film: 22 k Ω , 5%, 1/8 W	1	CF1/8-22K/J	09021	
R32	Same as R7				
R33	Same as R14				
R34	Same as R14				
R35	Resistor, Fixed, Film: 1.0 k Ω , 5%, 1/8 W	2	CF1/8-1.0K/J	09021	
R36	Same as R35				
U1	Integrated Circuit	2	TL064CN	01295	
U2	Integrated Circuit	1	MM74C14N	27014	
U3	Integrated Circuit	1	MM74HC08N	27014	
U4	Integrated Circuit	2	CD4028AE	02735	
U5	Integrated Circuit	1	MC14528BCP	04713	
U6	Integrated Circuit	1	DG212CJ	17856	
U7	Integrated Circuit	2	MM74C165N	27014	
U8	Integrated Circuit	9	CD4094BE	02735	
U9	Same as U4				
U10	Integrated Circuit	1	ADC0809CCN	27014	
U11	Integrated Circuit	1	MM74C244N	27014	
U12	Integrated Circuit	2	AD7523JN	24355	

WJ-8625-1 VLF RECEIVER

REPLACEMENT PARTS LIST

REF DESIG PREFIX A6

REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
U13	Same as U8				
U14	Integrated Circuit	1	CD4025BE	02735	
U15	Same as U1				
U16	Same as U12				
U17	Same as U8				
U18	Same as U7				
U19	Integrated Circuit	1	NMC27C32	27014	
U20 Thru U25	Same as U8				
XU10	Integrated Circuit, Socket	1	ICN-286-S5-T	06776	
XU19	Integrated Circuit, Socket	1	ICN-246-S5-T	06776	

REPLACEMENT PARTS LIST

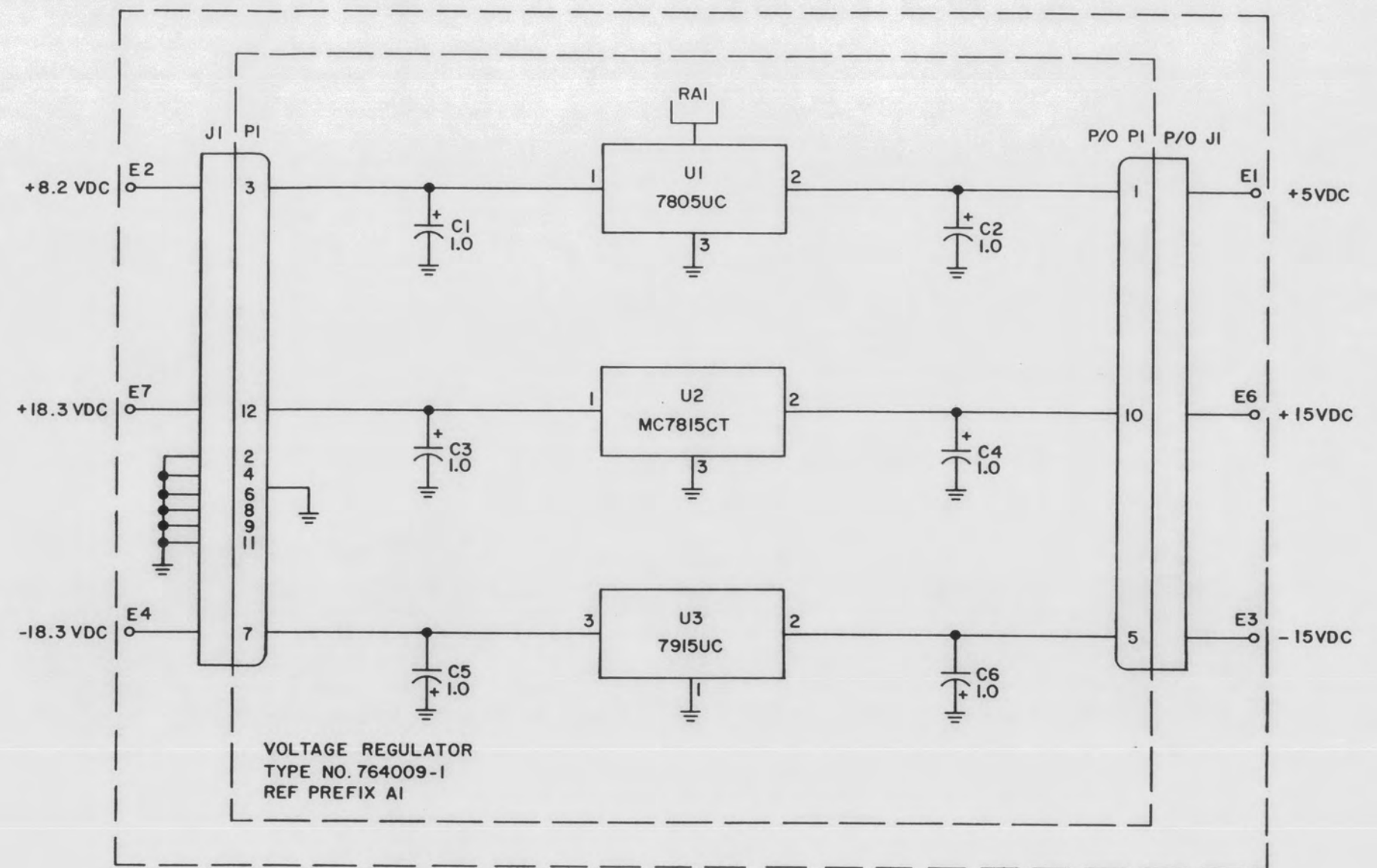
WJ-8625-1 VLF RECEIVER

5.5.7 TYPE 271134-1 LED FLEXIBLE BOARD

REF DESIG PREFIX A7

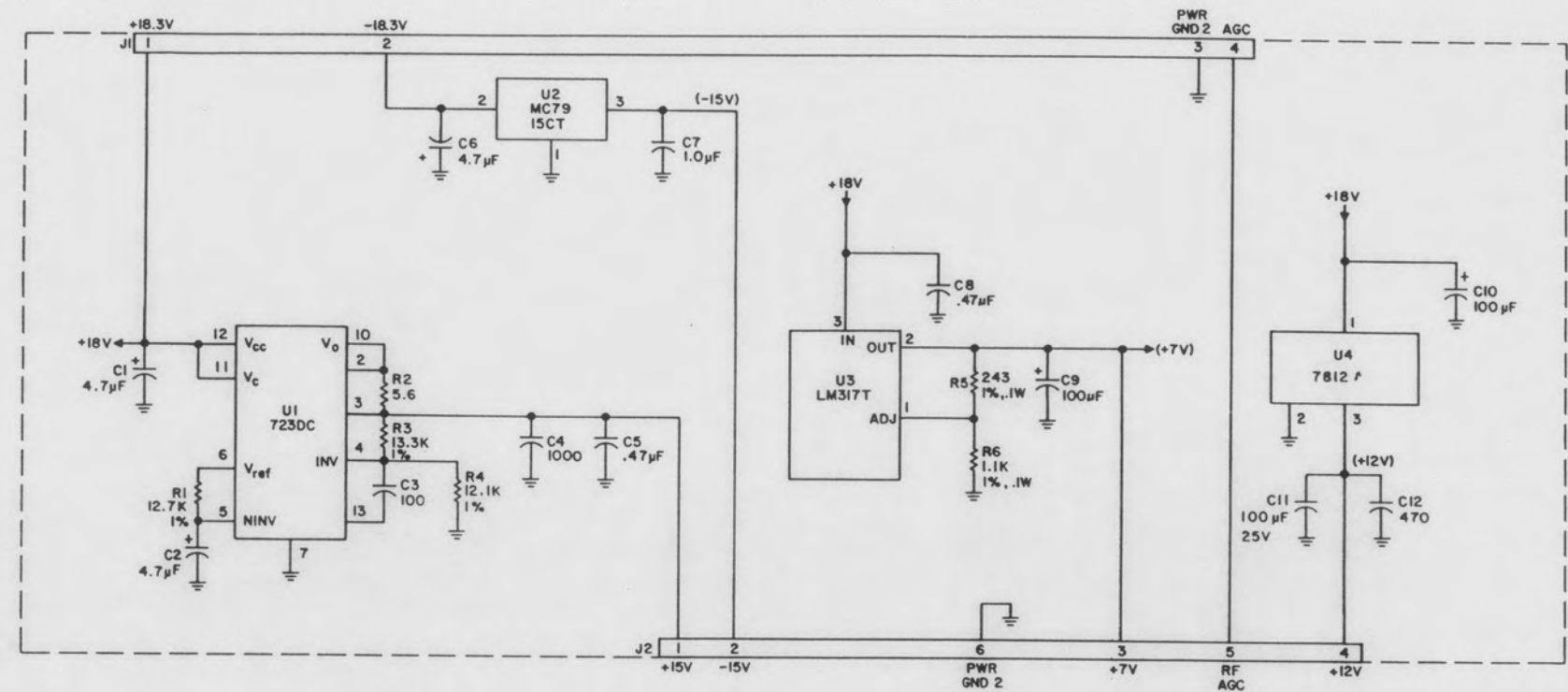
REF DESIG	DESCRIPTION	QTY PER ASSY	MANUFACTURER'S PART NO.	MFR. CODE	RECM VENDOR
DS1 Thru DS3	Indicator, LED: Tri-Light: Red, Yellow, Green	1	L-112-ADC	51682	
P1	Connector, PC Board	1	76314-103	22526	

SECTION VI
SCHEMATIC DIAGRAMS



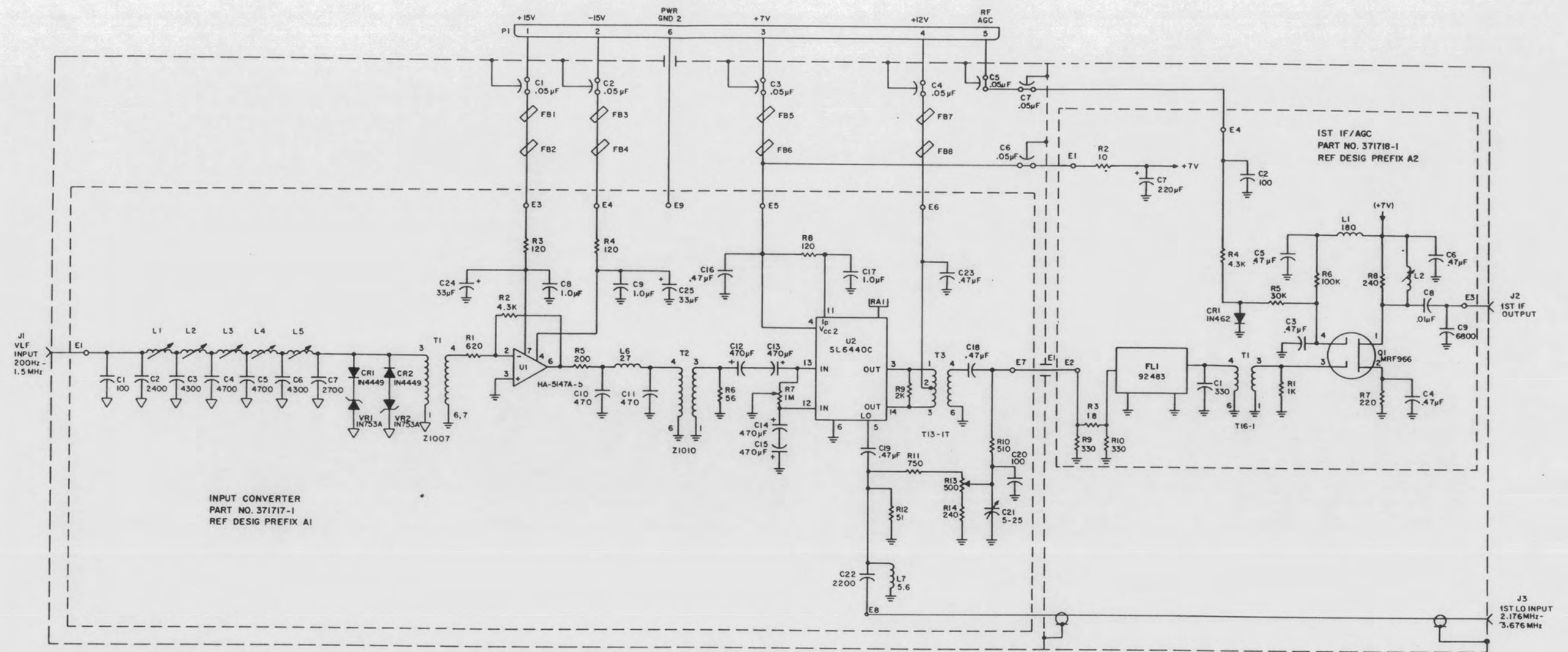
NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN μ F.

Figure 6-1. Type 271153-1 Voltage Regulator Motherboard (A1), Schematic Diagram 370950



NOTE:
 1. UNLESS OTHERWISE SPECIFIED:
 a) RESISTANCE IS IN OHMS 5%, 1/4W.
 b) CAPACITANCE IS IN pF.

Figure 6-2. Type 794613-1 Input Converter Power Supply (A2), Schematic Diagram 471402



NOTE:
 UNLESS OTHERWISE SPECIFIED
 a) RES IN OHMS 5% 1/4W
 b) IND IN μH
 c) CAP IN pF

Figure 6-3. Type 794614-1 Input Filter Converter (A3), Schematic Diagram 471403

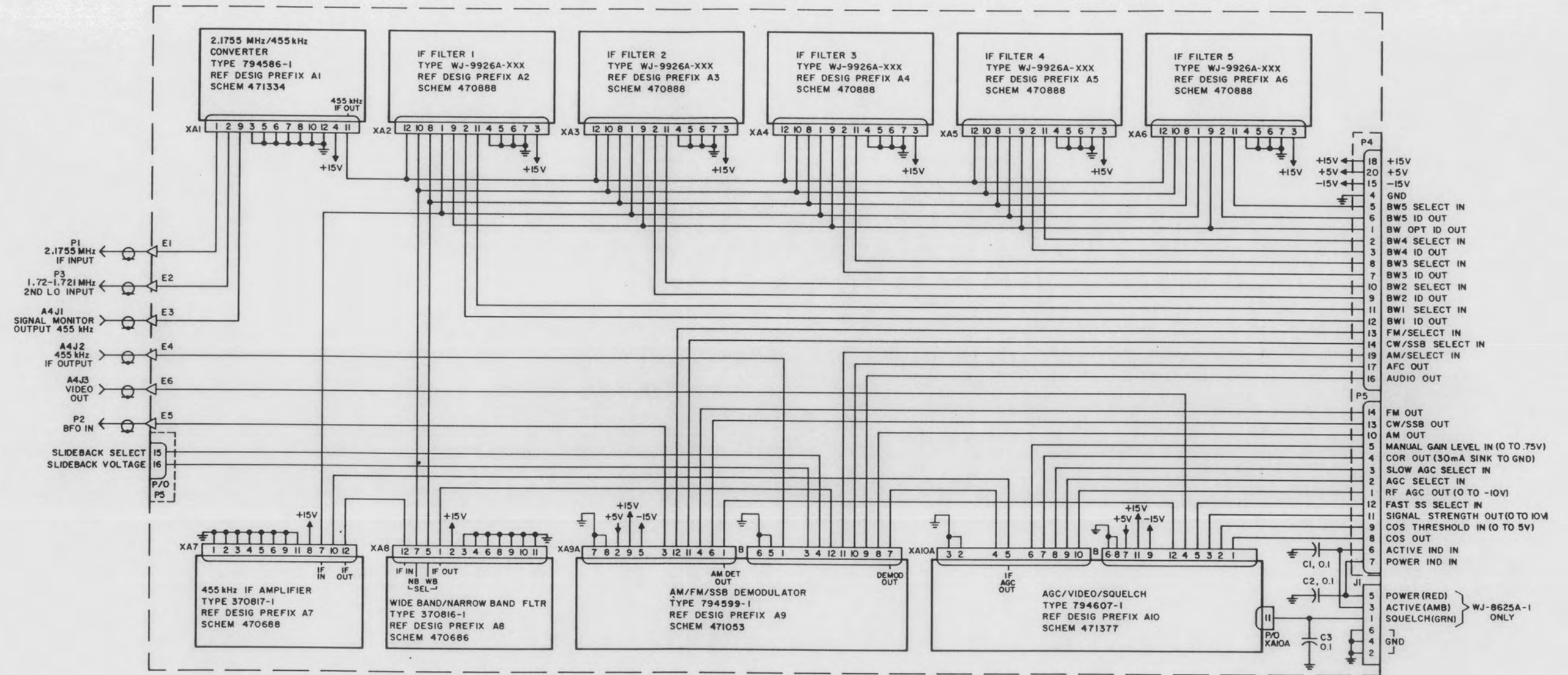
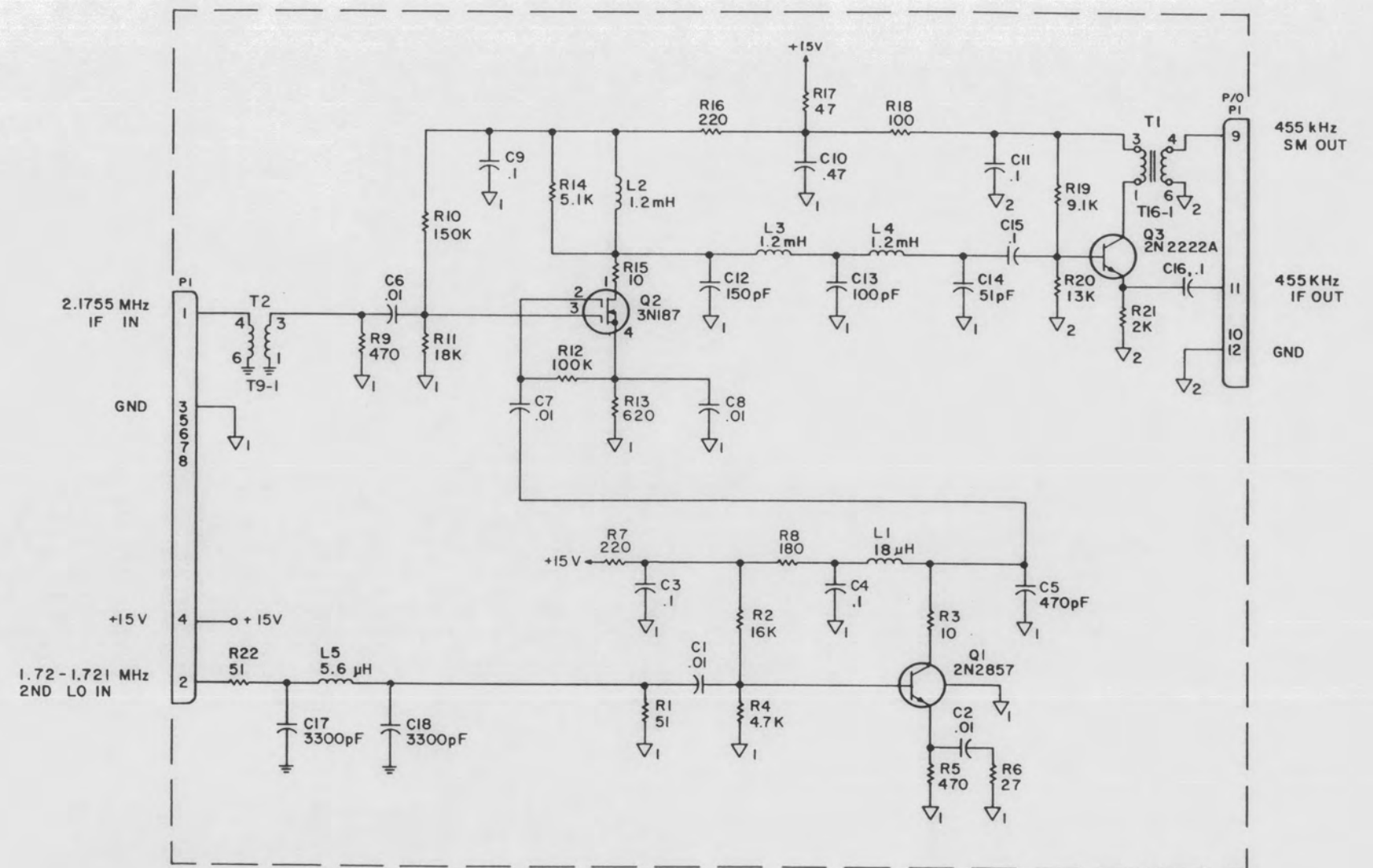
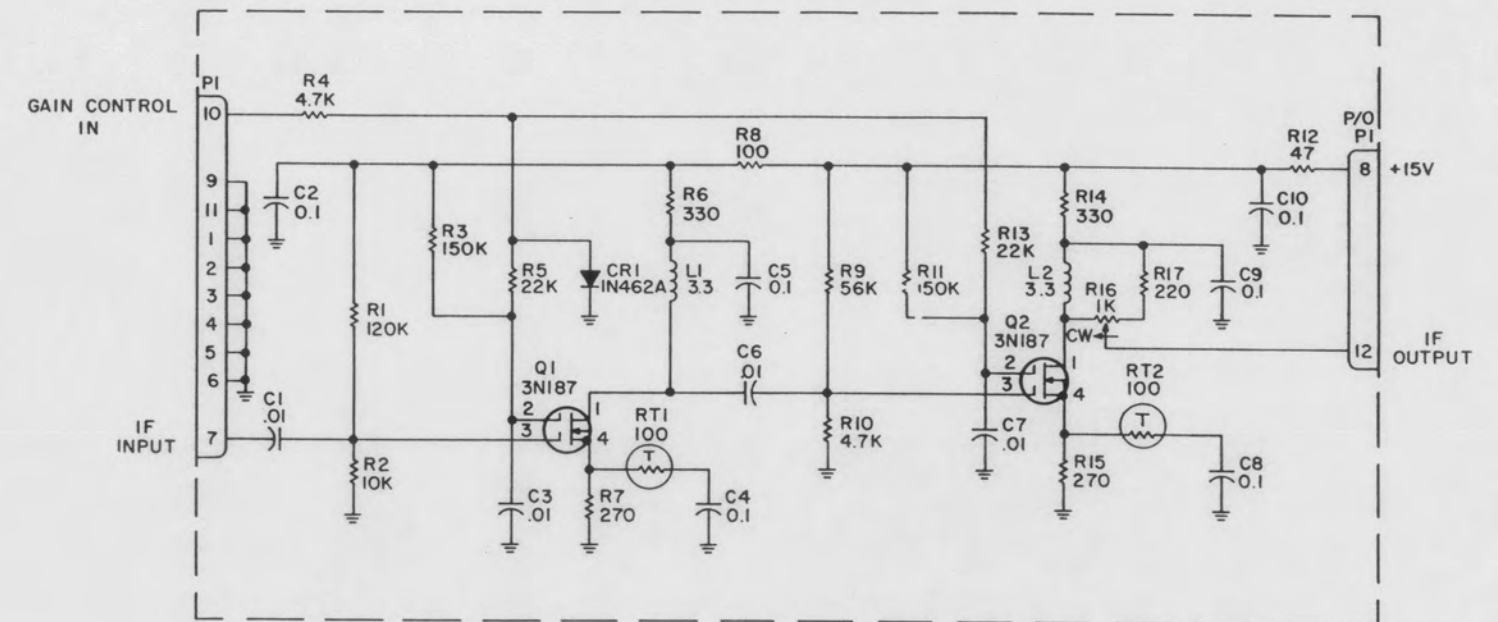


Figure 6-4. Type 794598-1 IF Demodulator Motherboard (A4), Schematic Diagram 470590



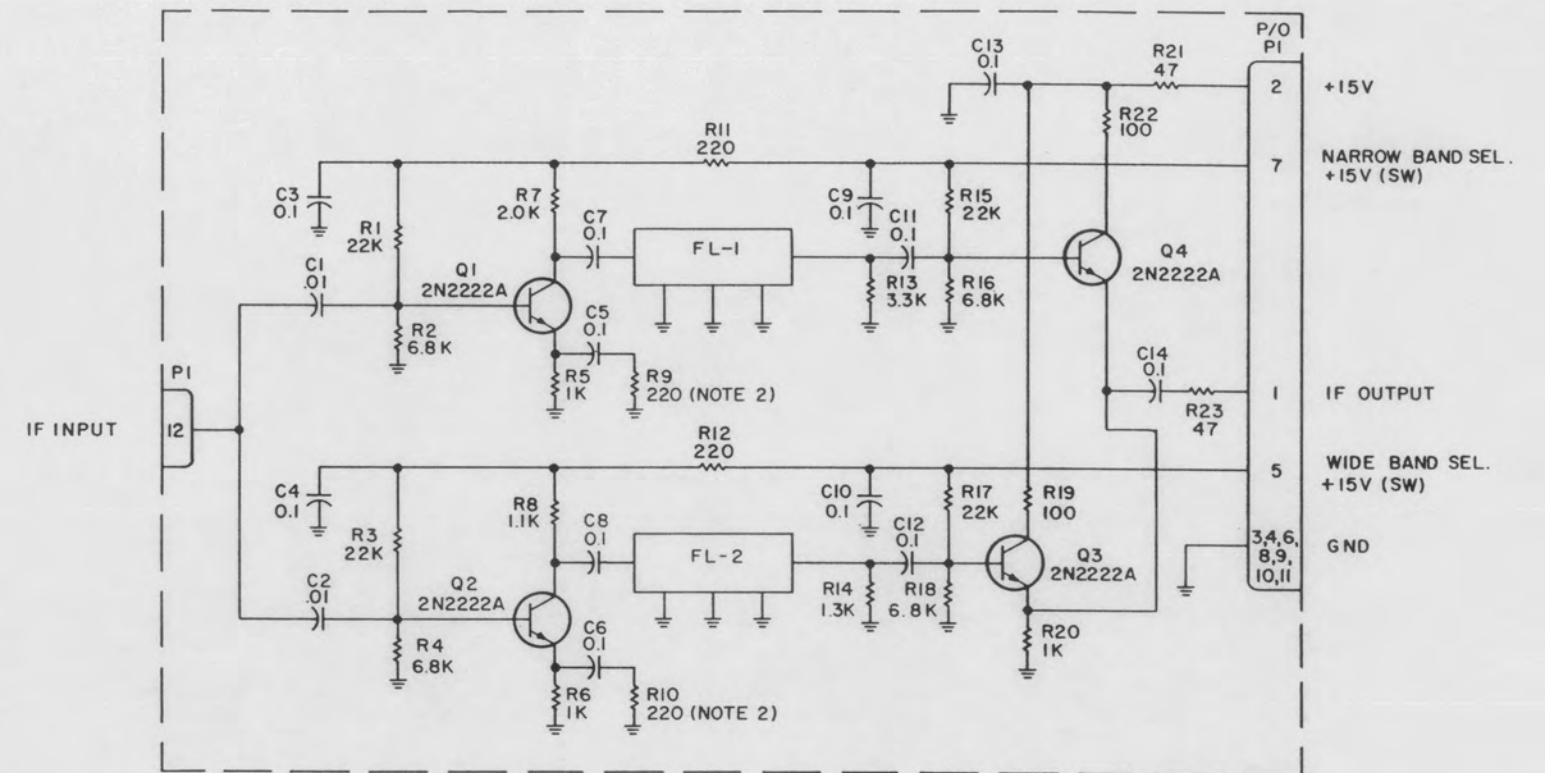
NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a) RESISTANCE IS IN OHMS, $\pm 5\%$, 1/4W.
 b) CAPACITANCE IS IN μ F.

Figure 6-5. Type 794586-1 2.1755 MHz/455 kHz Converter (A4A1), Schematic Diagram 471334



- NOTES:
1. UNLESS OTHERWISE SPECIFIED:
 - a) RESISTANCE IS IN OHMS, $\pm 5\%$, 1/4W.
 - b) CAPACITANCE IS IN μF .
 - c) INDUCTANCE IS IN mH.
 2. CW ON R16 INDICATES CLOCKWISE ROTATION.

Figure 6-6. Type 370817-1 455 kHz IF Amplifier (A4A7), Schematic Diagram 470688



NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a.) RESISTANCE IS IN OHMS, $\pm 5\%$, 1/4W.
 b.) CAPACITANCE IS IN μ F.
 2. NOMINAL VALUE FINAL VALUE FACTORY SELECTED.

Figure 6-7. Type 370816-1 Wideband/Narrowband Filter (A4A8), Schematic Diagram 470686

- NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a) RESISTANCE IS IN OHMS, $\pm 5\%$, 1/8 W.
 b) CAPACITANCE IS IN μF .
 c) INDUCTANCE IS IN mH.
 2. NOMINAL VALUE; FINAL VALUE FACTORY SELECTED.

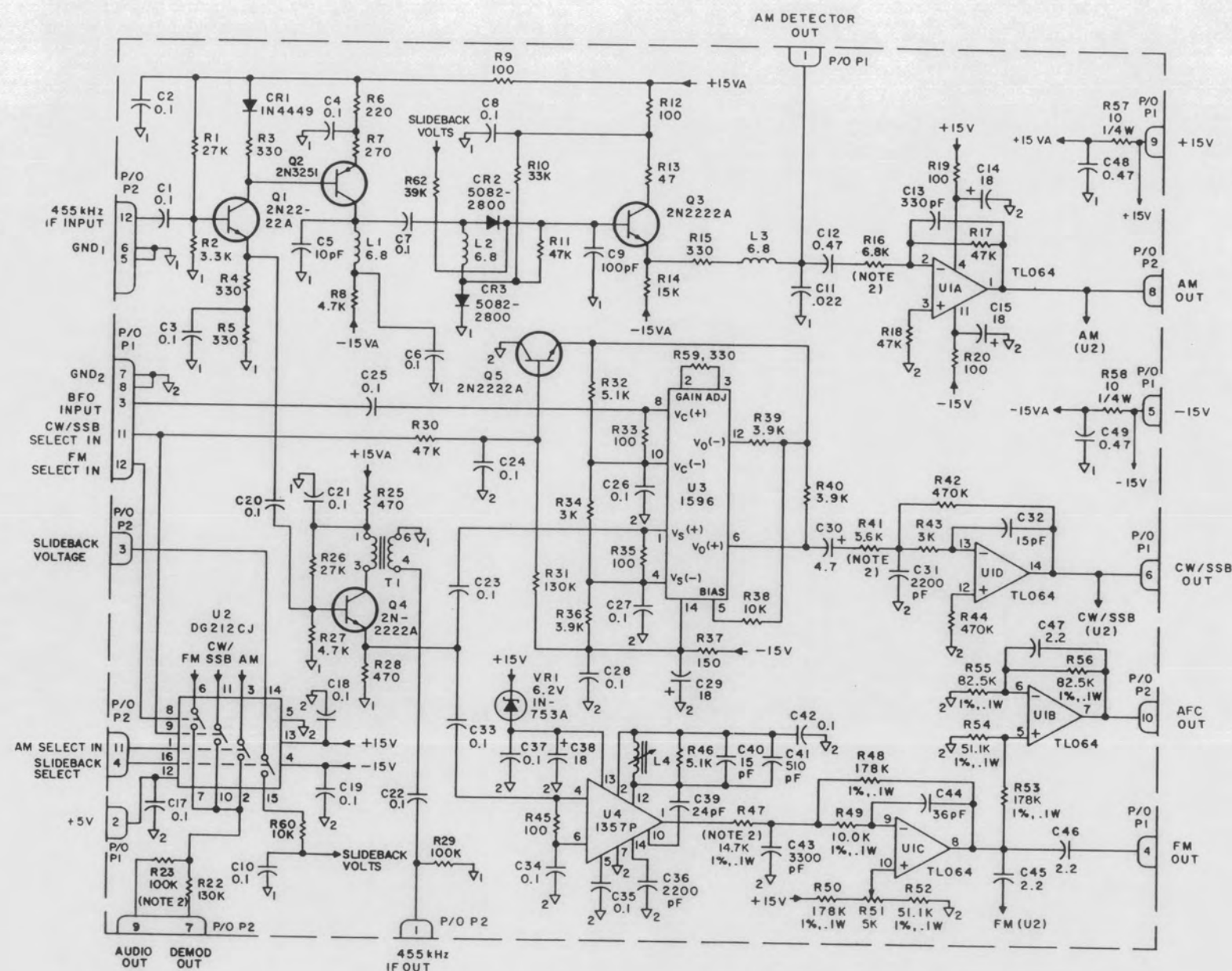
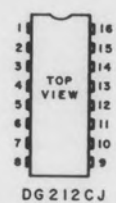
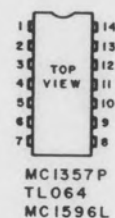
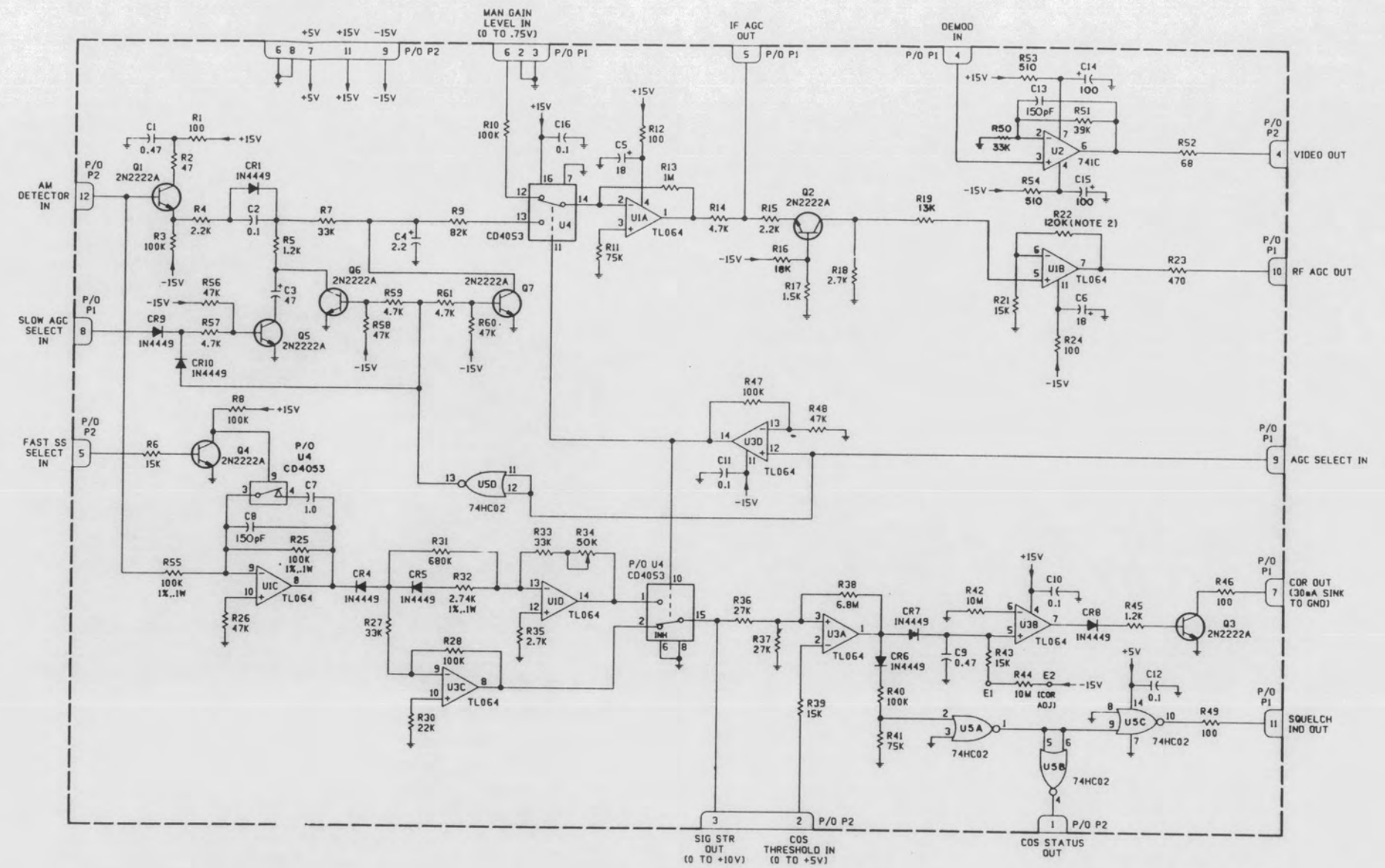


Figure 6-8. Type 794599-1 AM/FM/SSB Demodulator (A4A9), Schematic Diagram 471053



NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a) RESISTANCE IS IN OHMS. $\pm 5\%$ 1/4W.
 b) CAPACITANCE IS IN μ F.
 2. NOMINAL VALUE, FINAL VALUE
 FACTORY SELECTED.

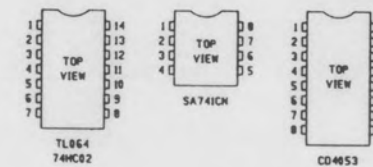


Figure 6-9. Type 794607-1 AGC/Video/Squelch (A4A10), Schematic Diagram 471377

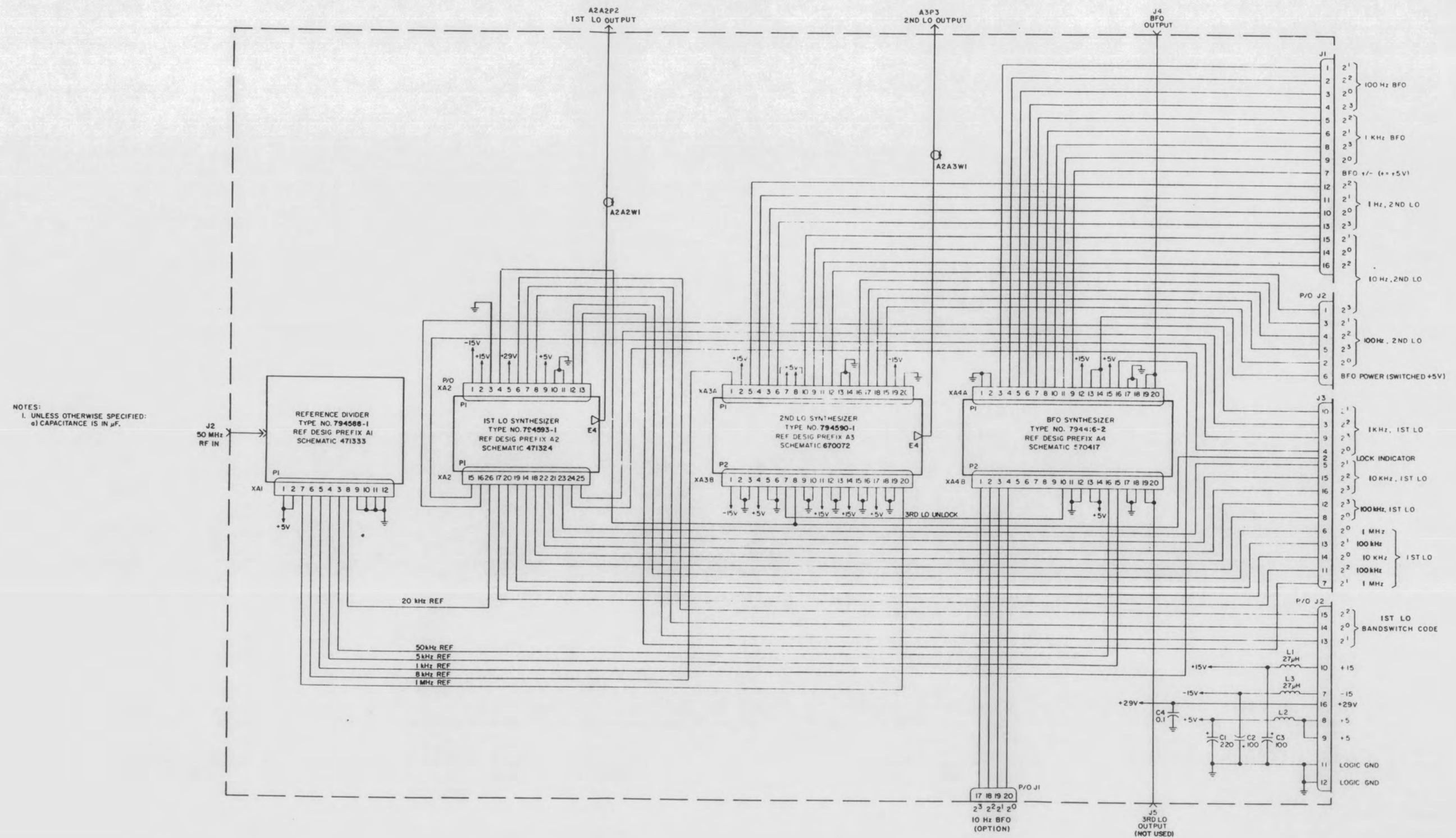
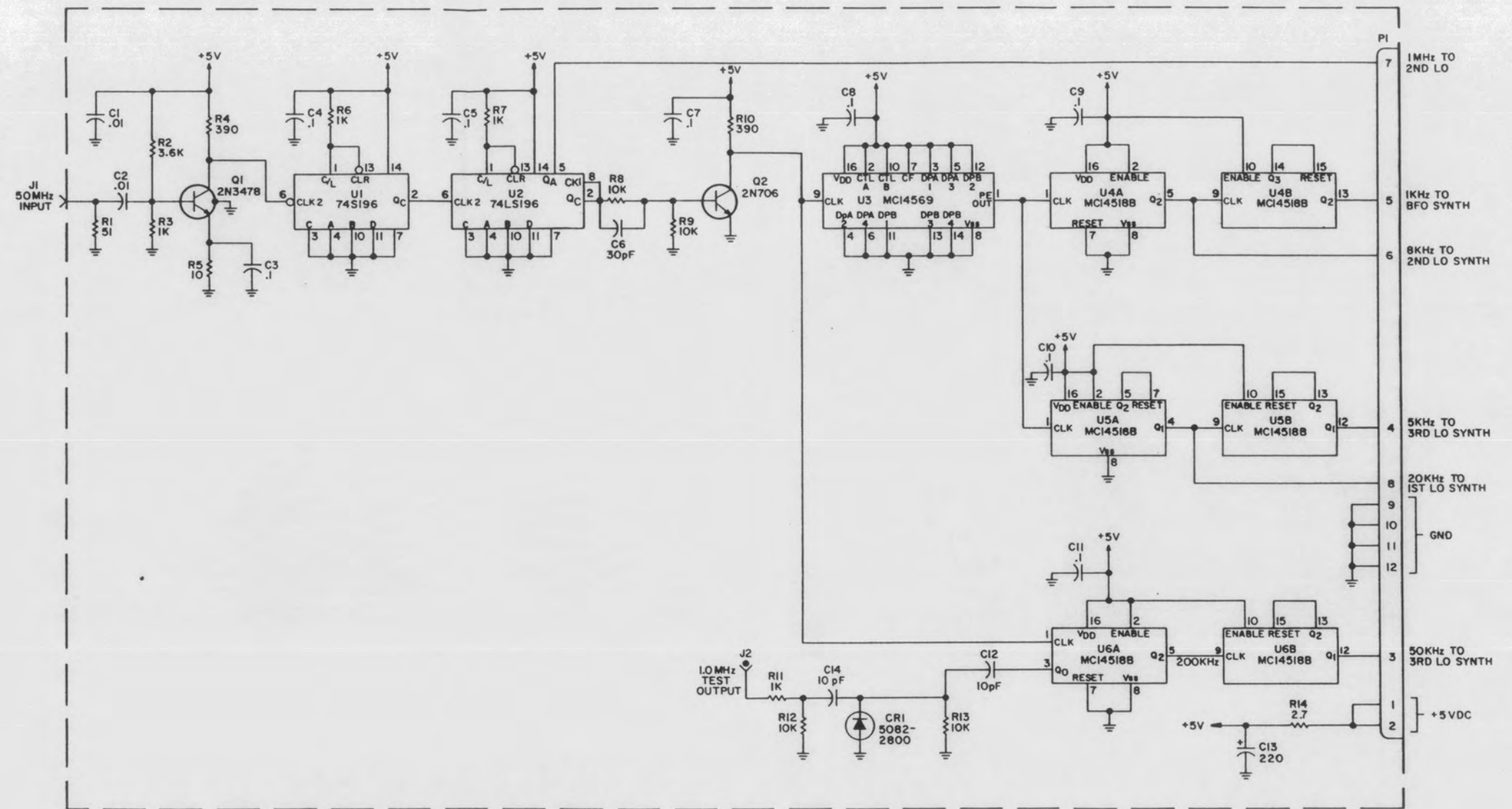
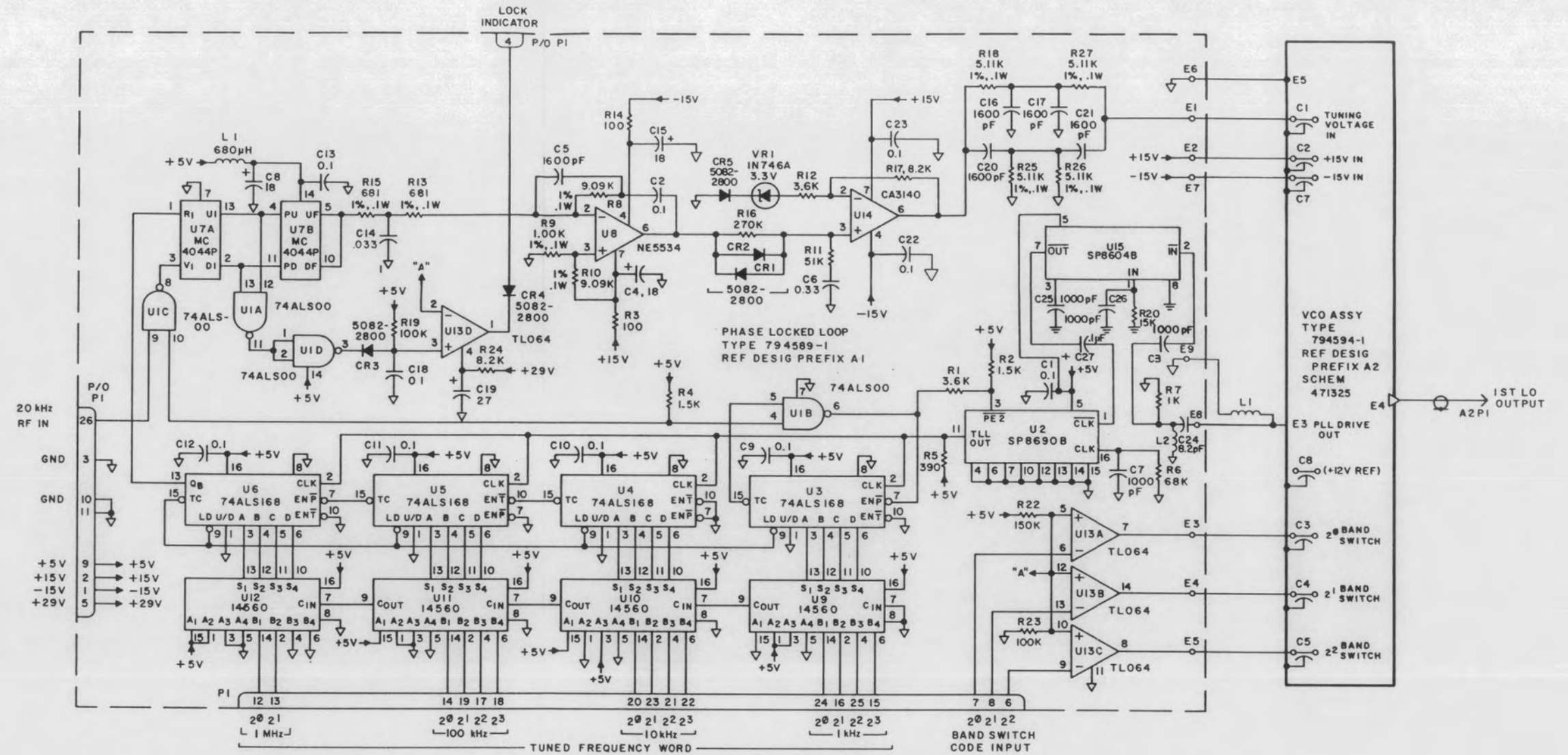


Figure 6-10. Type 794414-2 Synthesizer Motherboard (A5), Schematic Diagram 570418



NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a) RESISTANCE IS IN OHMS, ±5%, 1/4W.
 b) CAPACITANCE IS IN μF.

Figure 6-11. Type 794588-1 Reference Divider (A5A1), Schematic Diagram 471333



NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a) RESISTANCE IS IN OHMS, ±5%, 1/8 W.
 b) CAPACITANCE IS IN µF.

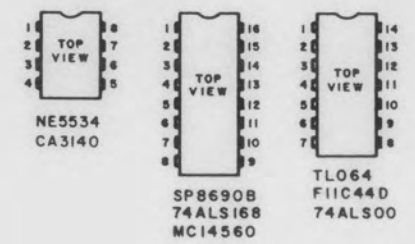


Figure 6-12. Type 794593-1 1st LO Synthesizer (A5A2), Schematic Diagram 471324

- NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a) RESISTANCE IS IN OHMS, $\pm 5\%$, 1/8W.
 b) CAPACITANCE IS IN pF.
 c) INDUCTANCE IS IN μ H.
 2. DIFFERENCE BETWEEN TYPES IS IN W1.

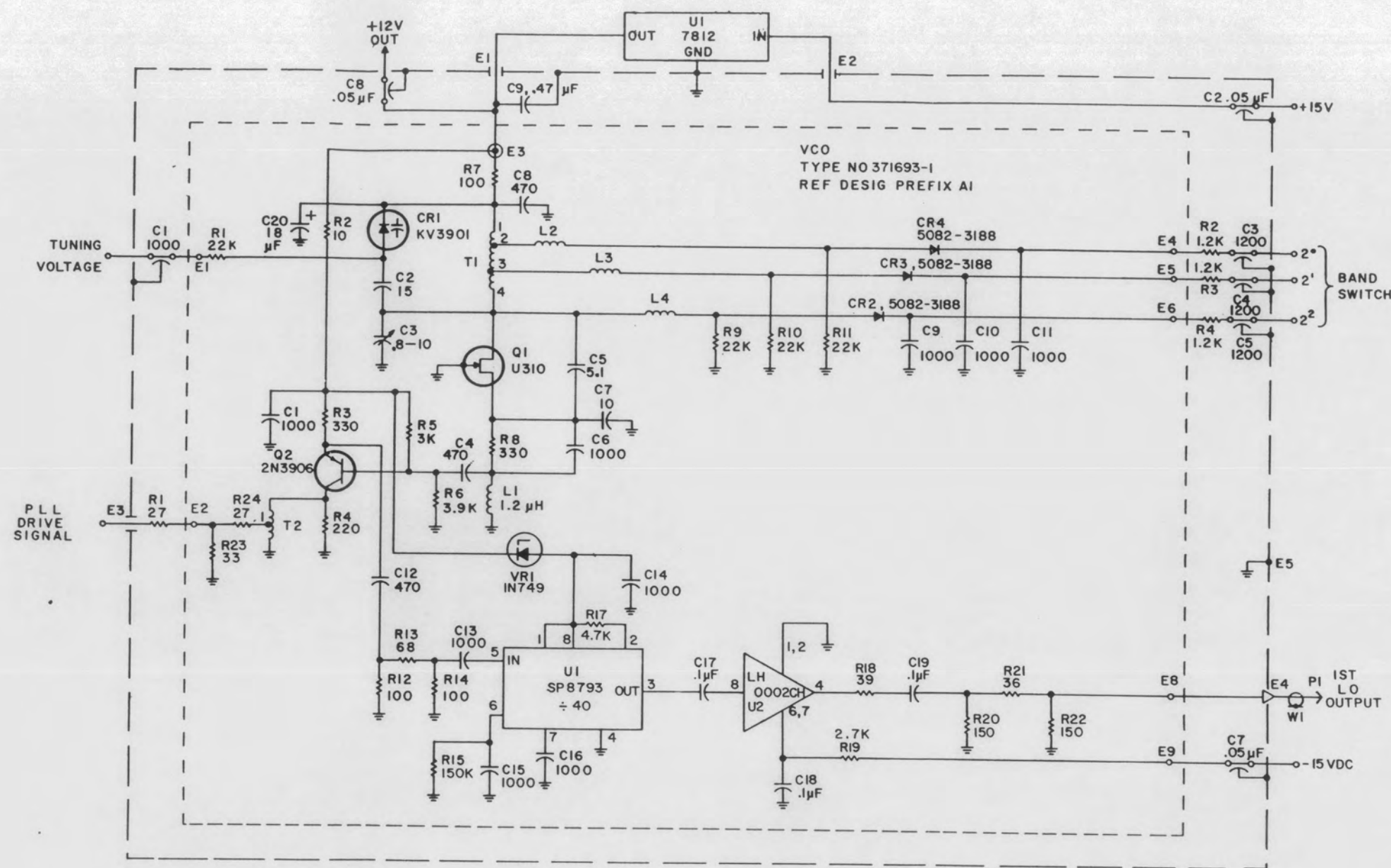


Figure 6-13. Type 794594-1 VCO Assembly (A5A2A2), Schematic Diagram 471325

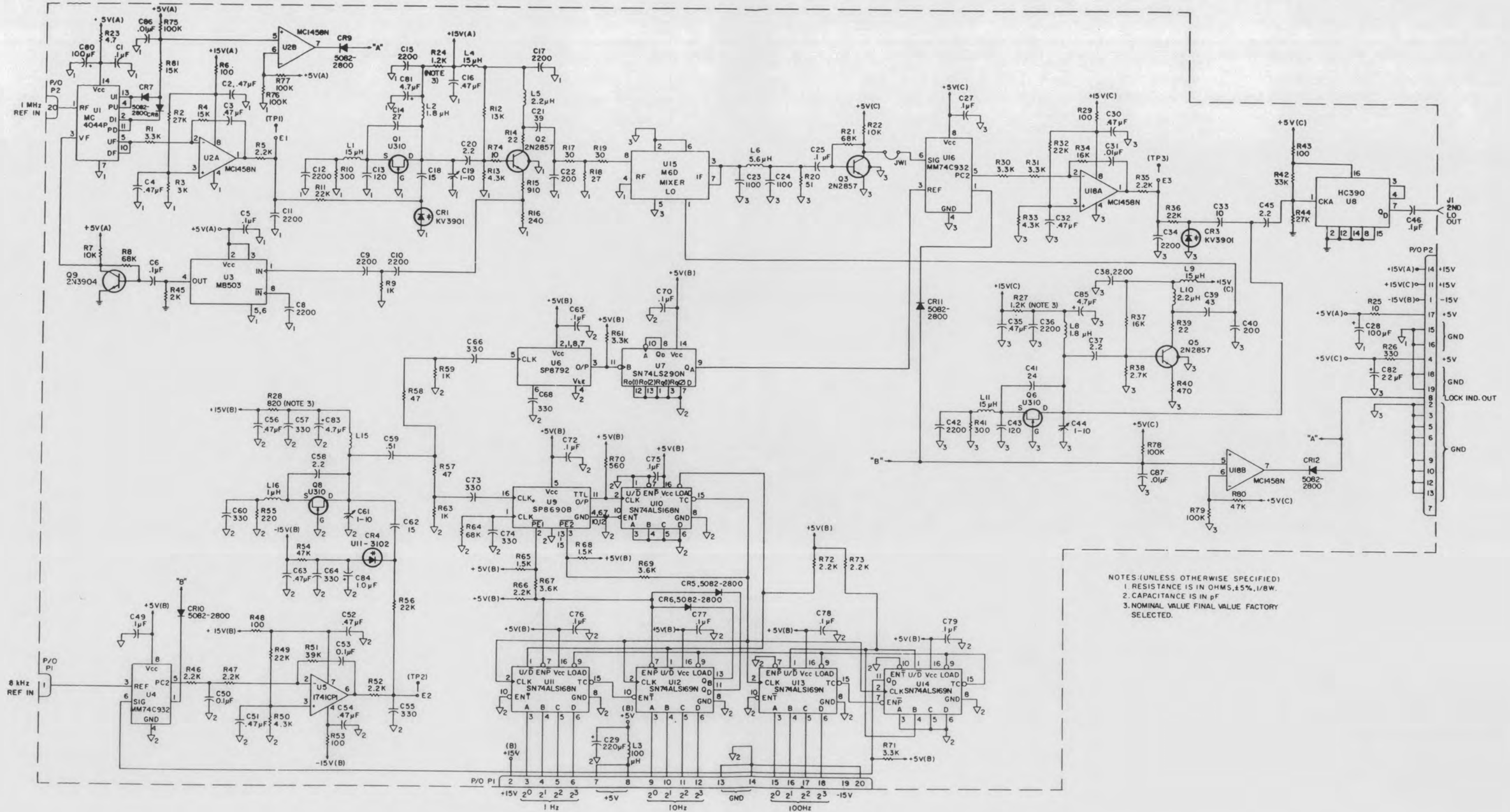


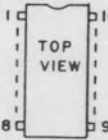
Figure 6-14. Type 794590-1 2nd LO Synthesizer (A5A3), Schematic Diagram 670072

NOTES:
 1. UNLESS OTHERWISE SPECIFIED
 a) RESISTANCE IS IN OHMS, $\pm 5\%$, 1/4W.
 b) CAPACITANCE IS IN pF.

DETAIL A



DETAIL B



DETAIL C



REF DESIG	VCC	GND
U1, U15	8	4
U2	7	4
U3	5	6
U4, U5, U6, U11	14	7
U13, U16	14	7
U7 THRU U10	16	8
U12	16	8
U14	14	1

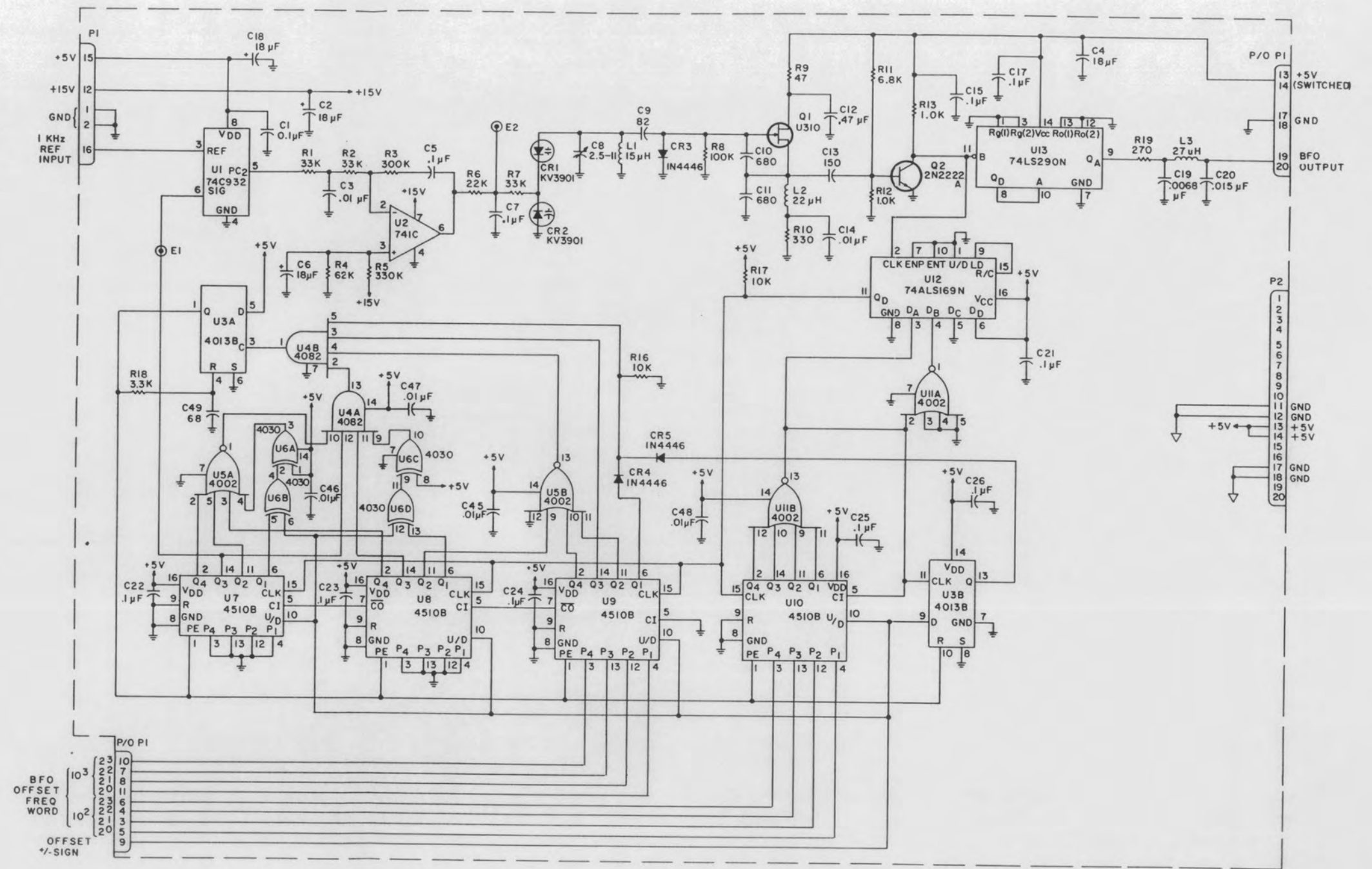


Figure 6-15. Type 794416-2 BFO Synthesizer (A5A4), Schematic Diagram 570417

NOTES:
 1. UNLESS OTHERWISE SPECIFIED:
 a. RESISTANCE IS IN OHMS, $\pm 5\%$, 1/BW
 b. CAPACITANCE IS IN μF

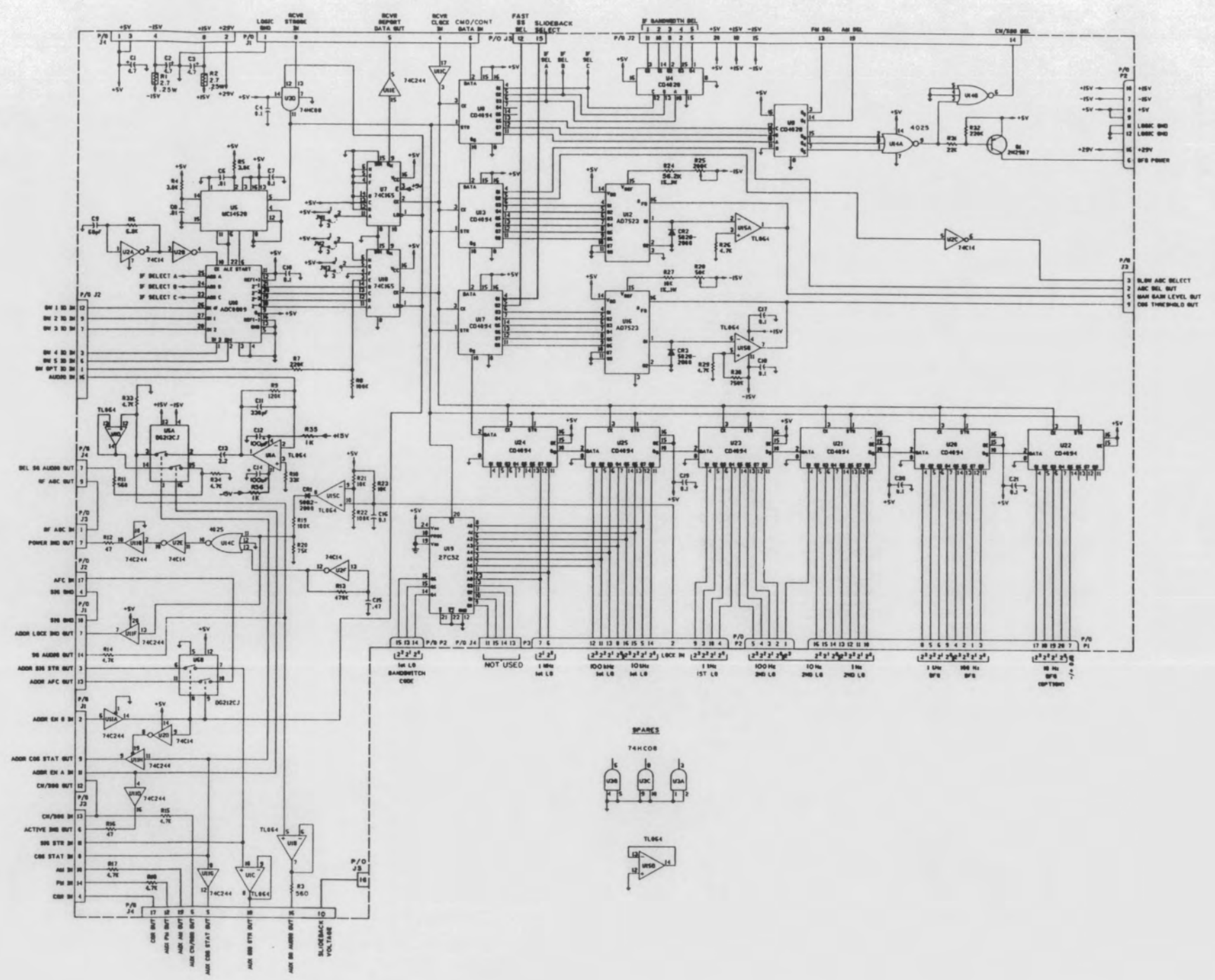


Figure 6-16. Type 794600-1 Digital Interface (A6), Schematic Diagram 471376

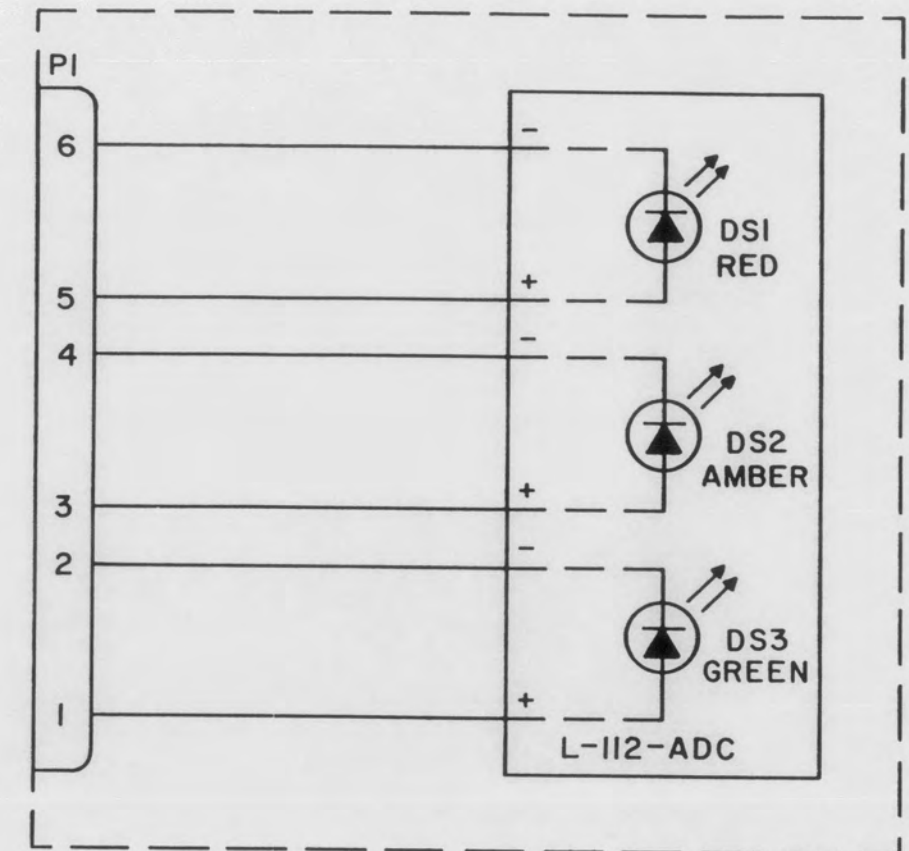


Figure 6-17. Type 271134-1 LED Flexible Board (A7), Schematic Diagram 271135

NOTES:
1. UNLESS OTHERWISE SPECIFIED:
a) CAPACITANCE IS IN μ F.

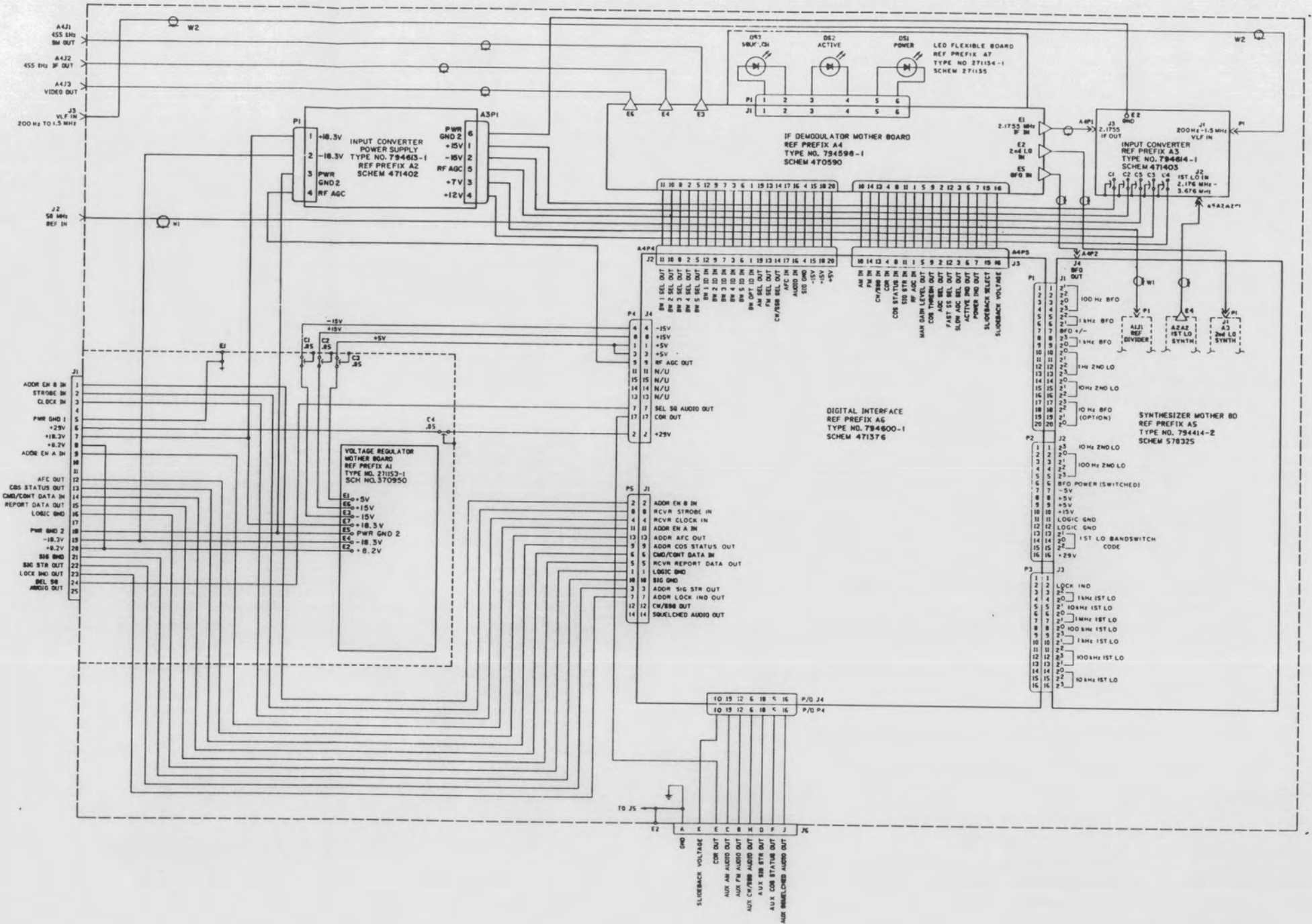


Figure 6-18. WJ-8625-1 VLF Receiver Main Chassis, Schematic Diagram 471335